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ABSTRACT

This document reports on the mission statement and long term plan of conservation education. Association articles included are: (1) "Conservation: Its Permanent Agenda in America" (Paul F. Brandwein); (2) "REEP: Environmental Education Curriculum Development and Implementation" (Richard James); (3) "Big New Ideas-Where Are They?" (Robert Rodale); and (4) "Learning By Design" (Mario Salvadori). Six workshops are summarized. (YP)

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CONSERVATION EDUCATION ASSOCIATION

A National Organization, founded in 1953, open to all persons and organizations interested in forwarding the broad aspects of environmental and conservation education.

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A PERMANENT AGENDA FOR CONSERVATION

Proceedings of the 35th Annual Conference

Pocono Environmental Education Center
July 31-August 4,1988

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The American Institute of Architects

WHAT IS PEEC?

The Pocono Environmental Education Center (PEEC) is located 20 miles south of where New York, New Jersey and Pennsylvania meet, and is within the boundaries of the Delaware Water Gap National Recreation Area. As a field center for environmental education, its classroom consists of a 38-acre campus with residential facilities plus 200,000 acres of public lands. PEEC has been designated a National Environmental Study Area and an Exemplary Center for Excellence in Science and Energy Education. The center is managed by PEEC in cooperation with the National Park Service.

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CEA MISSION STATEMENT

Conservation Education and the Use of Natural Systems in Conservation Teaching

It is increasingly evident that the quality of the biophysical and social environments are deteriorating at a rate that threatens human survival. CEA recognizes that science, technology, and conservation will necessarily have an important role in solving these problems. "Conservation consists in the recognition by people of their interdependence with their environment and with the development of a culture which maintains that relationship through policies and practices necessary to secure the future of a sanative environment." (Brandwein 1967)

Conservation and conservation education are concerned not only with the biophysical environment, but also with the fitness of the entire environment of which humans are a part. This environment is socioeconomic as well as bioeconomic and the resources we humans would conserve are in the domains of life, matter, and energy. Policies and practices which would secure and maintain this environment fit for life and living free from undue exploitation and pollution are economic, political, social, and moral.

Since soil, air, water, cities, plants, and animals do not conserve themselves, but are conserved by people, it follows that when people are not concerned, environment is not conserved. It is critical therefore that conservation educators concern themselves with environmental issues. Origins of newer public policies and practices are in the children that we educate. Children that we educate are the children we conserve. In turn the children we conserve with compassion and competence may in turn conserve environment with compassion and competence. For these reasons the Conservation Education Association urges the following actions:

•It is imperative all students develop an understanding of how humans relate to natural systems, and realize the importance of making wise individual and social decisions in respect to the use of natural resources and maintaining a human habitat fit for life and living.

•Conservation educators have the responsibility to help people establish a firm knowledge of fundamental scientific principles in order that they might better comprehend, realize, and predict the consequences of human actions on natural systems.

•First hand interaction with terrestrial, aquatic, atmospheric, and human designed components of the environment is considered by CEA both relevant and necessary for effective teaching and learning. With this experiential base conservation educators can help people to develop the reasoned thinking that results in responsible decision making and action regarding human/ecosystem interactions.

•CEA supports policies and practices that promote increased awareness and responsible educational use of terrestrial, aquatic, atmospheric, and human designed components of the environment.

PURPOSE The major purpose of CEA shall be the promotion of conservation education at all levels. Conservation is interpreted in its broadest sense to include a person's relation to and dependence upon the total environment. It encompasses all aspects of natural and built environments upon which people rely for the development and maintenance of a desirable social, economic, scientific, cultural, and political climate. It charges people with the obligation to influence and manipulate environmental factors that will strengthen and maintain the quality of the environment.

CEA'S LONG TERM PLAN

At the suggestion of Ken Frazier, Past President of the Conservation Education Association (CEA) and with support from the Keland Endowment Fund of the Johnson Foundation, twenty-five people were invited to a strategic planning conference at Wingspread, Racine, Wisconsin. CEA brought together a team of national leaders to plan for improving environmental literacy and the quality of environment. We examined the conservation education mission, identified measures for assuring effective leadership, and formulated a conservation education agenda for the 1990's.

The following mission statement was adopted by the CEA Board of Directors during the meeting in January at Wingspread:

"The Conservation Education Association, through the conduct of programs that help people arrive at an awareness and understanding of human relationships with the environment, shall develop and maintain strategic plans that result in significant contributions to the wise use of natural and human resources."

Introduction

The decade of the 1970's was a period of awakening and awareness regarding environmental concerns and issues.

The 1980's was a time of developing an information and knowledge base among the general public.

During the decade of the 1990's tremendous social, technological, and educational changes will greatly impact and guide conservation education's agenda.

Natural Resources

In the 1990's, natural resource issues and their social implications will become increasingly more critical and life-threatening. Conservation education efforts must continue to educate the public about the interrelationships of our global natural resources of water, soil, air, renewable and non-renewable resources, plants, animals, and humans while focusing on such dramatic issues as habitat loss, acid precipitation, surface and ground water pollution, solid and hazardous waste disposal, new energy sources, and biotechnology.

Social Changes and Changing Technology

Conservation education efforts must recognize societal changes involving shifts in population, the "graying of America", minority populations, and changes in information dissemination, in family structure, in leisure time, and how mass media is challenging the concept of schools as the primary education force in the lives of young people. Conservation education efforts must adapt to utilize current and changing technologies to reach targeted and changing populations.

Networking and Leadership Development

Networking of individuals and organizations will become an increasingly important element of conservation education efforts in the 1990's. During these years, conservation education must provide leadership training opportunities at the organizational, practitioner, and individual citizen levels.

Conclusion

As we move into the decade of the 1990's, leaders in the conservation education field have begun to re-think the mischanging society and technology, we have begun to reform our agenda by focusing on strategic planning, leadership, networking, and utilizing leading edge technology and techniques to improve environmental literacy in this nation.

The next step in the process is for CEA to develop a position statement, "Conservation Education and the Use of Natural Systems in Conservation Teaching." You are invited to help draft the position statement and will keep CEA members apprised of our progress.

CONSERVATION: ITS PERMANENT AGENDA IN AMERICA

Paul F-Brandwein

We are undeniably a self-examining society. We seek through our institutions to reconcile the claims of the individual and the group, with those of society. And in doing so, we argue for a discipline of responsible consent - and dissent. We hold to a belief that one makes one's way honorably through mastery of the knowledges, values, and skills required to bring us the life we want and cherish.

So we seek to maintain and sustain our society and culture in an equitable, mature balance that is hard-tried and hard-won. Nevertheless, the winning is to be achieved in a balance of opposing opinion without coercion. Indeed the purposes of schooling AND education are to avail to all of us the armaments that fit us to conserve, transmit, correct, and amplify the good in our culture that defines for us as well the life we wish to live.

As I press the point that a permanent agenda for conservation exists, I am impressed with the arrogance of any individual who attempts to synthesize such an agenda. Grant, please, that it isn't arrogance but that at this critical turning point the planet is taking, a try at synthesis is worth doing - even at the risk of failure. Indeed, I learned long ago that the tasks of scholarship often demand that we go too far so that others may sensibly go far enough. Percy Bridgman, Nobel Laureate, set me straight on where, or how, to seek the beginning of opening the black box of unyielding problems - once the problem was sufficiently clarified. He taught that a concept was synonymous with the corresponding operation; i.e., to measure the length of a room uses a simple operation, a tape measure; to measure the speed a car can attain one does not measure its capacity to attain it by its color. And similarly, one may measure the agenda of individuals, or associations, or institutions by what they do. And the concepts teachers believe in are noted in the main by what they teach and bring overtly to associations of like-believers. There may be still another way: certain psychologists teach that the agenda of individuals with regard to the culture is demonstrated through a singular concept: it is stated in their standing quarrel with the culture.

In any event we have a beginning. We may observe in thought, speech and the action that which individuals as gathered people - in their competence - bring to their associations; there they transmit the ideas they wish to conserve, correct and amplify. And over the years, an observer can synthesize certain of these ideas that give form to an agenda. And so I have attempted to do.

We are met to consider an agenda for the conservation, transmission, correction and amplification of a distinctly human behavior we have designated conservation and, at times, environmental education; the standing quarrel with the culture we have pointedly pressed is one which marks us as conservationists. That quarrel is evidenced in our commitment to the maintenance of a permanent agenda that sustains a sanative (a healthy and healing) environment we are obligated to protect as an earnest of our respect for life. That this must be a permanent agenda is hardly worth arguing. The world has changed - awesomely - and the human species that has created the change is now required to take on the thought and action consistent with the change. We are the central animal in a Global Econiche; that is, we live with all life. Thus it is the human (not other animals) who is responsible in great part for the large-scale alteration in the biosphere.

Edward O. Wilson[1] tells us:

> What event likely to happen during the next few years will our descendants most regret? Everyone agrees, defense ministers and environmentalists alike, that the worst thing possible is global nuclear war. If it occurs the e n t i r e human species is endangered; life as normal human beings wish to live it would come to an end. With that terrible truism acknowledged, it must be added that if no country pulls the trigger the worst thing that

will probably happen - in fact is already well underway - is not energy depletion, economic collapse, conventional war, or even the expansion of totalitarian governments. As tragic as these catastrophes would be for us, they can be repaired within a few generations. The one process now going on that will take millions of years to correct is the loss of genetic and species diversity by the destruction of natural habitats. This is the folly our descendants are least likely to forgive us. (pp. 67-68)

His charge is but one of many that commands assent - but it is of the first order. Each one of us could think of others - all more or less laid at the door of the species we represent. We need to talk first about certain characteristic behaviors of our species.

In many respects we now live the life our forbears dreamt and built for us. But we do not now inhabit the biosphere they left to us; in the age of genetic engineering we may not even be the same kind of biological variants that they were. But I anticipate.

Our behavior may be assigned to elements that may be viewed as species-specific, culture-specific, and field-specific. Species-specific because we are a distinct species with hereditary structure and function; culture-specific because our functions, and even our biological structure are altered by our specific culture; and field-specific because our self-imposed thought and action as conservationists set us apart and oblige us to adopt a special agenda. Especially are we required to consider that we are an association committed to education in conservation. Before I take on a serial analysis along the three-lines that structure our discussion, let me comment on the mischievous use of that crushing term education, a term that defines our association; it is, nonetheless, one that either directs our commitment or must be redefined.

Inevitably, as happens from time to time, our society comes to one of its strange turning points; crises, by definition, are turning points or cross-roads. Social, economic, and political problems assail us, not necessarily signaling a breakdown of the social fabric, but acknowledging the behavior of a nation bursting against its bonds, and surging toward unexpected solutions. But we expect (because it is our culture that makes us confident) that, given our zeal and purpose for achievement, in the end "solutions" will be found - tolerable, good, effective "solutions". Inevitably, too, as always comes to be realized with a kind of effective surprise, education is considered to be central to the solution of the problems. Indeed, now and then we realize that education is a root function of a self-examining and self-correcting society. In effect, reformers press upon us, in our now-vulnerable living rooms, the idea that an educated, well-informed public in the areas of social, economic, and political thought is necessary for "survival". Constant improvement, never-ending change of "the educational system" is pressed upon us as central to the life of a democracy.

But we do not have an educational system; what we have are many schools, some school systems, and many educational modes and systems, each a component of a specific community. There is, furthermore, a vital difference between schooling and education. Somehow, in the common speech, we have come to consider that the institional form of education devised for children - namely, schooling - constitutes the educational system. Education is commonly defined as a "change in behavior". In considering the influence on change in behavior we need to rid ourselves of the notion that schooling specifically devised for children or minors has the impact on societal change we claim for it. The renewing of our educational systems should rightly include a major focus on schooling, but it should focus as well on other institutions, places, or influences that change the behavior of individuals with subsequent impact on changes in society. And we are members of a Conservation Association; while schooling of the young is urgently part of our root agenda we may not, may we, disregard our commitment to other devices that change behavior, those that are rooted in education.

As a first approximation of necessary definition, it might be said that schooling attempts to transmit the concepts, values, and skills prized by a community acting under the constraints of public custom, rule and law (local, state and federal). Education, on the other hand, is a large amalgam that affects all of life and living and comprises all influences, in school and out, that affect and effect changes in the behavior of the individual - whether of habituation, of character or of intellect. These changes in the behavior occur

throughout life and are not necessarily equated with graduations or exits from any form of endeavor, public or private. Thus, education occurs in situations and institutions outside of school - at home and with family; at church; synagogue; temple; mosque; informal religious encounters under the influence of non-churchgoers; in one's life with peer and nonpeer groups; in chance encounters; from TV, newspapers, books, and magazines; from experience; from reaction to failure and success; definitely in a job or jobs; from crises generally; in personal contemplation and retreat - to mention only a few.

Surely TV - that other life - is not regularly part of schooling. Yet in random moments, for purposes of illustration, I noted these events: surely part of education in conservation. Some of these events are also reported in the press.

Item: Pear thrips have seriously affected the maple tree stands in Vermont - and this during sugaring time.

Item: The population of alligators (protected under law) has increased almost beyond control; in some instances the reptiles have become dangerous to human life.

Item: A condor chick is thriving in San Diego - fed by a puppet disguising a zoologist's hand.

Item: The consequences of the nuclear accident at Chernobyl have not receded; the milk of cattle in Sweden is still showing excessive radiation. Soil in certain areas of Norway and Sweden shows radioactivity.

Item: Our National Parks need considerable renovation.

Item: A Congressional committee is investigating the possiblity that the greenhouse-effect is now in "evidence". Experts are relating the effect of altering the environment on life generally and the economy specifically. Some ascribe the drought to the greenhouse-effect, and the burning of fossil fuels as a source of energy. (In a pharmacy, a shopper is heard thus, "What the hell is the "greenhouse-effect?)

Item: In Toronto, at the summit of the Seven Nations, "acid rain" is discussed.

Item: The EPA reports that Aldicarb, a pesticide, is being found in aquifers in various states.

How many of these will be discussed - in adequate emphasis - in schooling? Note that these were "seen" or "read" at random not in the teaching sequence of non-randomized experience available in the planned instruction necessary to form basic concepts and predictable generalizations. The teaching that results in predictive generalizations is the business of schooling. How are we to meld schooling and education as part of our permanent agenda?

Indeed, a function of education in conservation, far exceeding the limitation of schooling, may well be to insure a habitual vision of the nature of the Econiche we would perfect for our future and for the young who would inherit it.

In any event, in my view, discussions of conservation education need to consider the implications of curriculum and instruction in conservation for schooling, as well as that for the university, as well as the uses of education in life and living generally. Conservation education in the adult world may be infused and is certainly diffused in the acts of living. However, conservation education intended for the special environments of schooling is designed for inclusion in specific areas of instruction; it is not and cannot in my view be randomly infused; it deserves to be on a par with other subject matters. I am obliged to reserve discussion of schooling and education within the domain of our field-specific behavior.

Moreover, the superordinate and overarching conceptual scheme accepted by conservationists is abundantly clear: the construct interdependence permeates our thought policy, and dictates - or should govern - our actions. And so it is obvious that while the constructs of species-specific, culture-specific, and field-specific domains may be isolated for discussion, it is obvious they interact in such intricacy they cannot be separated as we convene policy; all three interwine in an ecology of achievement.[2] We will find that even as we examine our Econiche, we also are required to examine the ecologies of achievement that maintain us in nature and nurture. Curiously, we shall find the species-specific traits of the human in the generation of new knowledges or skills act constantly to produce a society constantly in need of education: a society constantly confronted by the rush of new knowledges, new attitudes, new skills. But such species-

specific traits depend in turn on the culture - i.e., conservationists opposing the uses of pesticides, the oppressions of pollution, of pestilence, of noxious substances, drought, soil erosion, careless expansion of cities, of indiscriminate deforestation, and other factors that hasten the extinction of species that share the planet with us. Further, the field-specific positions of conservationists often place them in a position of defending the existence of species the culture is (in ignorance) bent on destroying; thus the conservationist becomes a protagonist of one type of evolution (biological evolution) and, as we shall see, antagonist to certain aspects of a culture-specific phenomenon in evolution (cultural evolution).

Against further discussion, it is safe to say that the ecology of achievement coming out of the interactions of the species-specific, culture-specific, and field-specific traits that compose the special Econiche of the conservationist make for unusually adventurous circumstances. We turn now to more explicit statements on the three character-rooted traits coming out of the DNA and particular sub-culture of the conservationist. Thus it is that the field of conservation in its field-specific ethics, and the conservationist in attitude and action, are bound in field-specific behavior that is signalled in a standing quarrel with the culture. Is this behavior part of our permanent agenda?

By definition, conservationists seek to bind themselves, and all, who share this planet, to the recognition not only of the interdependence of all organisms with the environment but their total dependence on it for life and living. Thus conservationists are bound in an undeviating obligation to sustain a certain relationship: the fitness of the organism parallels the fitness of the environment. And the truth of the statement is supported in its reverse: the fitness of the environment parallels the fitness of the organism. And naturally, the environment is the total of the internal and external events that affect the organism.

SPECIES-SPECIFIC BEHAVIOR

In truth, we do not know how our species-specific "intelligence" has conceived our present agenda, less how the brain sets down the concepts and premises we have or shall conserve, transmit, correct and amplify. Like our other organs, our brain has evolved from other organisms; we can trace its biological evolution. But what the human brain has created (or assisted in creating) on our planet is unique; our minds (created by our brains) are species-specific; indeed some minds are variants from an imagined "norm" in certain individuals of the species. We know that the tantalizing organ that controls thought and hand is, in weight, about three pounds; in the number of cells, about 100,000,000,000. How does this congress of cells - in multitudes of organisms - create, for example, a word, and that in a few hundered languages and dialects? A sentence? 2+2=4? How do we find E=mc2 - and predict that one gram of matter can produce so huge an amount of energy? E=1 gm (m) x $3x10^{10}$ cm/sec)^2 (c) = $9x10^{29}$ ergs (E)? A book? How does it create St. Paul's? The ceiling of the Sistine Chapel? A dam? A conservancy? A park system? CFCs? Not to say a society or culture - or the multitudes of acts done in a single day? How do the constructs of d, n, and a become DNA? How does the brain tell us how to maintain an ecosystem or biodiversity? We don't even know how it dictates the spelling of these terms.

We know the brain thinks and creates. We don't know how it thinks and creates. We won't know until we can understand how neurons "create" a thought. And how DNA structures the traits of memory (scanning and retreival), of imagination, of invention. Until then these remain words; we do not know how to teach critical thinking; we do know that the brain somehow understands the process of converting relevant facts into generalizations. But the words, equations, the music and art we create, the parks and cities we build, the crises we nourish into being, are human - that is, they are species-specific in origin, use and understanding.

To go a bit further: Once having made up our minds, how do we change our minds? Indeed, we don't know how the

brain creates mind, the sum total of our capacities of intellection and adaptation to our environment, proximate and universal. Considering how little we have discovered of the way the three-pound object works, it is not surprising this object cannot yet tell us how it does its work. How can we know the nature of the incandescence of a "thought" until we know the biology, physics, chemistry of the phenomenon of "thought" in its passage from neuron to neuron to a memory, or a work that enables other minds to assess its nature and value? Ah yes, we do however know something of the chemistry that will destroy its function, or modify its optimum physiology; conservationists have a catalog of substances that destroy body and mind; we call them pollutants, pesticides, toxic wastes, drugs.

Not knowing how we create, we do know some things of the environment that encourage the doing of new things - and some things about the environments that deny the doing of creative things. We seem to be able to nourish the brain in experience so that the brain may create mind; in the educational histories that prepare the brain to create, say in science; the brain of the 3-year-old "reinverts" itself, does it not, during its journey to become the 15-year-old? The collective brains of scientists (conservationists among them) constantly uncover and discover "new" data and convert the data into information, and that information into knowledge, attitudes, behaviors and skills. So we find The New York Times of February 16, 1988 reporting that at least 40,000 scientific journals are now estimated as available over the world, flooding libraries and laboratories with more than a million (sic) new articles each year.

Knowledge in all the sciences and their adjuncts, their technologies, is now purported to double every 8 to 11 years depending on the discipline, down from doubling in 15 (the estimate differs with the estimator) but there is every expectation that the generation of knowledge will continue at a greater rate. Yet to develop a curriculum from initial plan to the deployment of complete instructional materials, including textbooks, computer programs, and videodiscs, may take 7 years. Thus for instructional materials to remain current, we are obliged to undertake a continuous revision. To be specific through illustration: In uncovering the regularities of the universe through science, we also invent the technologies that aid us and plague us. If scientists have uncovered the regularities of magnetism and electricity, valence and quantum theory, genetics and evolution, the unity of cells and homeostasis, then technicists have brought to use aspirin and penicillin, lasers and cyclotrons, automobiles and airplanes, and surgery, the Kantrowitz heart and transplanted heart, Kanred wheat and tree cropping, Herefords and Holsteins, IR-8 rice and the Iowa and Maine potato, hybrid corn and Poland hog, the space shuttle, Pioneer 15, nuclear bombs and nuclear reactors, radio and television, and computers. We invent gasoline and PCBs and CFCs and dioxins, calculators, digital watches, and plastic coverings; not to say the creation of the master-machines that make the machines which in turn make buttons, clothing, poison gas, carpets or cornflakes, or those that burn coal, or oil, or exhaust from pipes and smokestacks, and which in turn may create acid rain and possibly a "greenhouse effect" or "holes in the ozone layer".

It follows that the schools are the resource of our scientists and technicists - and also, of utmost importance, of our conservationists and ethicists. If we weigh carefully the impact of science and technology on society, then we must weigh the impact of the values we hold on the scientist, technicist, and conservationist of the future; the children, the boys and girls in our schools. For all of them are in our schools. Their schooling - in terms of curriculum and instruction - has now become critical: Their survival and ours is now based on the choices we and they will make. Is not their schooling, education, and survival and ours central to our permanent agenda?

Nonetheless, here we are in the twentieth century faced with this dilemma: Which is to dominate, man or megamachine? Humanity or technology? Which is master, which servant?

Now it is that the world is also at one of its strange turning points. Western society may be the first society to take what sociologists and anthropologists call the "5000-year leap", a dramatic redirection of civilization. (Or is Japan the first one to make the leap?)

The quantum leap of society is being likened to one that occurred some 5000 to 7000 years ago, a period related to the birth of the city. To reflect on the caliber of the changes, it might be useful to postulate a symbolic time scale such as this:

5,000,000 years ago - postulated origins of the human as "species" (now perhaps 7,000,000)

500,000 years ago - postulated origin and development of food-growing trees

50,000 years ago - Cro-Magnon man (he/she had time to paint)

5,000 years ago - the "first" city (some would say 7,000 years ago)

500 years ago - beginning of "universal" schooling in the United States (really some 90 years ago)

50 years ago - beginning of "universal" schooling in the United States (really some 90 years ago)

5 years ago - "man" steps on the moon (really decades ago)

We are now in the beginning throes of the post-industrial era. As Daniel Bell (1973) predicted[3] and the events bear him out. Perhaps by the year 2000 less than 10% of the population will be engaged in manufacturing goods for the other 90% or so. The 90% of the work that will be central to the postindustrial society will be accounted for by the professional and technical service fields - education, health, publishing, research and development, distribution, data processing, transportation, and the like.

The peoples of preindustiral society are engaged mainly in inducing the land to grow its produce; the industrial society induces machines to till their soil and harvest the crops, and to produce its goods. In an industrial society people are not necessarily in tune with the rhythms of nature, but with the rhythms of time, of clocks; the work is technical, planned so that energy - produced by fossil fuels, hydroelectric power, atomic energy, and soon energy from space (solar energy) - is harnessed for producing goods. More goods made by fewer people is the aim; in short, to increase production is to increase efficiency. Emphatically, in a postindustrial society, in an economy that is highly techno-electronic, the opportunities for advance in standards of living will be increasingly defined by education, not by schooling only. Yet all the young will require a minimum of a secondary schooling (or its equivalent). The kind of schooling and education that is requisite for life in the postindustrial society may well be rooted not only or mainly in schooling, but in schooling that prepares us for continuous life-long education.

The nature of this cultural evolution is worth brief mention. In an agrarian or preindustrial society, men and women contend with nature; in a postindustrial society, informed mind will contend with informed mind. The aphorism "a sound mind in a sound body" will come to mean "a sound mind in a sound body in a sound environment". Perhaps it is simplistic to emphasize that only sound men and women can fashion sound human bodies and sound human environments; but a human environment is a sanative one.

All in all, planet Earth has become a "global village". The political tremors in an underdeveloped nation and the oil policies of developing nations quickly affect the lives of Americans. The oceans no longer protect us from military attack or from social unrest half a globe away. A postindustrial society is truly based on information, and information is the property of an educated people.

In the United States, then, in just a few years (say, ten to twenty) schooling and education will be the criterional attribute of the vast majority of its citizens. Have we considered the fact that children entering kindergarten this year or the next will be in their majority in the early years of the twenty-first century? Thus, all citizens will perhaps be required to understand enough of the technical matters and detail enhancing and coercing life so that some degree of psychological safety and psychological freedom may be possible. Witness, for example, the anxiety produced by the failure to understand what had happened in the Three Mile Island nuclear "disaster". And the damage at Chernobyl! And the effect, in the future of the epidemiology of AIDS! And of

holes in the ozone layer ! And of the mountainous growth of garbage! And of the burial of toxic and radioactive wastes! You, no doubt, will recount your favorite terrors!

All the foregoing is but illustration and prologue. But it is an index of a species-specific thrust: That of Homo sapiens in a Western culture. What then is the face of the conservationist to be? Aside from the fact that the "face" will be permanently present - in one mien or another - what is his or her agenda in the postindustrial culture into which we are being hurled? All the young are in our schools. Are they not required to know the central conceptualizations of the environment that our species-specific behavior has brought about? And then, in their turn, to conserve, transmit, correct and amplify these conceptualizations. Or, in full mind, fashion new ones designed in the service of an ethic: Respect for life.

A CULTURE-SPECIFIC OBLIGATION: CENTRAL TO AN ETHIC AND PRACTICE OF CONSERVATION

What is it we attempt to do when we develop an ethic of conservation and devise it for use in curriculum and instruction? What is our purpose of recording in our instructional materials the enormous activities coming out of our vast technology our minds have conceived, and italicizing the enormity of its effects on the environments that nurture the living things that share the planet with us? Simply, we care for the small planet on which we live and we wish - indeed, we must, conserve the structure of the biological manners in our respect for life, we act unflinchingly to conserve it. It is to say that the operations inherent in the conservation of life, and the schooling, education, and culture that sustain it are synonymous with our being members of the Conservation Education Association. And, it is the mind and heart of our permanent agenda. In making and assenting to the statement, or any of its corollaries, we find our Association has taken on a veritable discipline of responsible consent in certain areas of thought and action, and responsible dissent in others.

Of one central element we may be fairly sure; a superordinate concept has been established: At every point in its development, the organism is the result of the interaction of heredity and environment. A malfunction of a gene may destroy an organism, but so may a malfunction of the environment. Whether the cause of the malfunction be called PCB, CFC, acid rain, drought, meltdown of a nuclear reactor, saturation of gases from the exhaust of automobiles, smoking of cigarettes over a lifetime, an infection spread by hypodermic needles, or the wholesale destruction of forests - tropical or temperate - or overcrowded cities, slums or ghettos.

And, of course, we as teachers - or educators in any task we undertake - do not tamper with the gene; we change the environment. For schooling and education are vast efforts to change the environment of the human organism. And, through these massive changes in brain and mind, we change - or do not change - the behavior of the organism who affects and effects the life of hosts of environments and hosts of organisms. For good - for ill.

The effect of outrageous behaviors of that primate in the Econiche that dominates Planet Earth (see pp. 42, 43) - the multiplying Departments of Environmental Protection composed of these primates notwithstanding - are documented. But each one of these outrages affects and effects the life and living of all other organisms and Homo sapiens as well. The meaning of the term environment is thus missed - and thus misused. We, and what we do, also become the environment. We can then spend the time and space allotted to me on the litany of abuses with which we overwhelm the Planet. I should like your indulgence in attending to one of these in the main if only because it is in effect the sum of all our abuses. Namely, the effect of the misuse of our technology on the biodiversity - that is, on the great and diverse life our planet shares with us; Wilson has put the matter plainly. So have Thoreau, and Muir, and Leopold, and Pinchot. And so have you.

Recall that recent studies inform us that some 65 million years ago a major extinction of life took place - a distinctive evolutionary event. During the time span of the event - some thousands of years - many species disappeared; paleontologists think this was a result of a change in the

planet Earth's atmosphere (a change in environment). According to Alvarez, it may have been due to the perennial dust cloud that obscured the sun as a result of bombardment by one or more asteroids. The extinction of species in that evolutionary period is calculated to be of the order of one species or so per thousand years.

According to various students, particularly Norman Myers (1979)[4] , we are witnesses of a second Great Extinction. By the year 1600 A.D., our species had practiced "overhunting" of animals; the rate of extinction rose to about four species every four years. In the twentieth centruy, we have become profligate. It is estimated by Myers that one million species may be lost in the last quarter of this century. Not only have human populations increased, and are increasing in regions where there is great biodiversity in life forms, but because of land and water conversion throughout the world that accompany population increases and industrial growth generally, the planet is estimated to lose its life at a current rate of one species per day. And soon, incredibly, Myers predicts one per hour.

Centers of Biodiversity: Global Ecosystems in Danger

Russell Mittermeier of the World Wildlife Fund has developed the notion of M7 countries (M for Megadiversity). This M7 parallels the Economic G7 countries that account for about 54% of the world's gross national product. Curiously, the M7 contain more than 54% of the world's species. Thus in a way the G7 countries (richest in goods and services) parallel the M7 (richest in the world's diversity of life).

To be brief (certainly to the point of seeming to ignore the vitality of the issue), the World Wildlife Fund recognizing, in a sense, the place of the human as the sole inhabitant of the Econiche we have mentioned, is beginning to focus its policies on saving whole ecosystems. In the briefest of summaries, the M7 constitute

-Brazil, with nearly 1/3 of the world's tropical forests, and the richest diversity of plantand insect species (i.e. 90% of the world's insect species)

-Colombia, with its greater variety of habitats in large part due to its different altitudes accounts for more species of birds than any other country

-Zaire, with Africa's largest area of rain forest is most species-rich on the continent

-Indonesia, with Asia's richest rain forests with more species of mammals than other countries

-Mexico, with species from both North and South America

-Madagascar, with species found in these two countries and Australia are found nowhere else

(N.B. Both Indonesia and Mexico are bridges between two continents, Mexico above - Indonesia between Australasia and Asia. Note also, Peru, Bolivia and Ecuador share the Amazon basin, the total richest area in species.)

The all too brief summary is offered to emphasize that conservation education must reflect global problems. Thus, while we may focus on the imperative to care for American Wildlife particularly, we are obliged to focus on a parallel responsibility that is rooted in our behavior as conservationists. It was Rene Dubos' dictum that we "think globally and act locally." As we shall see, whether we do so or not the permanent agenda inherent in conservation puts us in any way of affecting not only the evolved life and environment on which we act presently and locally, but affects the life that will evolve in the future. For there is a central thesis in conservation that is not now central to curriculum or instruction in conservation.

AN EMERGENT AND CENTRAL THESIS IN CONSERVATION

Over the past decades, I have had occasion to examine some 80 curriculums in conservation and some 40 school and university textbooks in Biology and in Conservation.[5] All posit in one way or another, that the centrality of curriculum and instruction in conservation is the reponsibility to inform society on the objectives, issues, and concepts central to the conservation of the environment and its resources for life and living. Put in other guise, the objective of conservation

education is culture-specific: To inform the culture so that it evolves in accordance with the dictates embodied in the most accurate knowledge and the consequent wisdom conservationists can muster. In a word, the conservationist is obliged to sustain the cultural evolution of society along an equable and civilized direction. It is not a subversion of the objectives of schooling and education in conservation to say that if the aim of the conservationist is to sustain the existence and health of ecosystems that maintain the population of species on this planet, that there is a forthright and significant consequence of the conservationist's support of the cultural evolution that sustains the practice that conserves the species inhabiting the planet: There is thus a[6] direct, explicit and implicit support of the biological evolution that produced and will continue to generate the varieties of species - and their precious gene pools. There is thus, a kind of homology that informs and sustains the permanent agenda undergirding the conservation of species.

By definition, we may consider that Biological Evolution is the transmission and transmutation of genes, action of knowledge, values, and skills. Thus, there is a certain congruence between the two, biological evolution and cultural evolution, as proposed by Gregory Bateson (1979)[6] . I take only small liberties in modifying Bateson's homology:

BIOLOGICAL EVOLUTION
(acting through Natural Selection)

acting on varieties of species of organisms

results in evolving species and eventually newer species of organisms

CULTURAL EVOLUTION
(acting through teaching and learning)

acting on varieties of data, concepts and conceptual schemes (ideas)

results in evolving concepts and eventually new conceptual schemes

The congruence of the two deserves study.

Consider that the permanent agenda in conservation education is to advance the causes of the environment, the Econiche adopted by the conservationist. Thus in advancing the causes of the environment through schooling and education the cultural evolution of the human species is rapidly advanced. If so, then the human species, understanding the significance of supporting a sanative environment, and thus to live with all life, is also obliged in wisdom to support survival of the organisms that are the very embodiment of the gene pools that are the root-source of the future of life on this planet.

It is further to say that the evidence is eminently clear that we as a species share the gene pool of many organisms on this planet. Further, we benefit from the sharing. Otherwise how could it be that a minuscule organism - a bacterium - can produce human insulin when its gene pool is slightly altered by the insertion of human genetic material, the "gene" that produces insulin in the human. Then are we not when we as conservationists, crusade to save what we call an endangered species - whether a tiny eastern fish, or a huge western bird, or a leviathan of a sea mammal, or behemoths of a distant continent, or a magnificent primate, or distant tropical forests, or a special island that is the home of giant lizards, or one that is the final abode of marsupial life - saving ourselves as well? Or at least part of ourselves? For the evidence is now abundantly clear that their kinship to us - and ours to the life of the world - is present in their DNA and ours. Thus, also, when we act to conserve a forest, or a praire, or farmland,

whose oxygen, whose soil, whose resources are we conserving?

Our permanent agenda becomes even clearer: In teaching conservation we govern an eminent domain of cultural evolution, and in so doing wisely and well we live with all life. And in affecting the cultural evolution of peoples throughout the world as they act, or fail to act, in conserving the world's life, we affect and effect the biological evolution of known, unknown, and unthought of species to come. Our own species, as well.

A FIELD-SPECIFIC AGENDA: CONSERVATION EDUCATION FOR INHABITANTS OF THE ECONICHE

There are two faces, two attitudes as it were, of our intent that come out of our field-specific agenda that require examination here. The first comes out of our teaching and transmission to learners of knowledges, attitudes, an skills whether in acts of acquisition or inquiry. The second comes out of an examination of the manner, that is, the processes of acquiring what we know.

We are teachers of conservation in one manner or another; and so we are obligated to formulate our agenda for the environments we call schooling and education. A permanent agenda, to be sure, however we propose to do it and in whatever aspects of the common or professional speech we say it. There, however, our colleagues in other disciplines or fields in education have us.

If I read the current thought and action in curriculum and instruction devised for conservation through schooling it may be either introduced through infusion throughout the curriculum or through a compact, time-bound curriculum commonly called a course of study. There are nonetheless a variety of views on the guise curriculum and instruction in conservation for the purposes of schooling should take; let me note at least three views and approaches among 14 that were offered in a recent conference of the National Association for Environmental Education.

There is Cheryl Charles (1988), who in unmistakable directness insists there is "agreement that environmental and conservation education is not a visible priority in public schools". She suggests that the power in determining what is actually to be taught (because there are "few state level and provincial level" mandates) lies with the individual classroom teacher, building principal, local school board and parents. She makes a case for programs designed to stand along (i.e., Project Learning Tree and Project WILD) which can be "infused into existing curricula". With candor, she describes the limitations of the approaach but proposes that it is "philosphically appropriate", and "realistic". Further, she gives evidence that these approaches are making progress.

David Engleson (1988) offers his concept of what environmental education should be for grades K to 12 expressed in the intricately fashioned but immensely practicable Wisconsin A Guide to Curriculum Planning in Environmental Education, reflecting the Tbilisi Declaration. Awareness, knowledge, attitudes, skills and participation are stressed. He finds the Curriculum Planning Guide in EE to be in consonance with Wisconsin standards requiring sequential plans in all curriculum areas with the incorporation of environmental education objectives into all plans. Truly a masterful plan for both a specific curriculum guide in EE and collaborative function in other curriculum areas.

Bill Hammond (1988) takes an analytical view of insertion or infusion. In analyzing the two he finds benefits of both, but notes also the possibility of hybridization. He presents us with "Key Operating Concepts" that guide him in "considering the totality of relationships that define the system as an integrated whole". They are eminently worth contemplating. His aim: "long-term sustenance" of a significant body of knowledge, attitudes, skills and of a total view of the curriculum; his ideal is not only "a holistic program which infuses its instructional goals and objectives in every class, in every subject, every day", but also "a comprehensive program that consists of discrete courses" and "in-depth" units of study which become the responsibility of a variety of classes. Thus, he seeks an integrated whole: after all, the environment is integrated in a whole.[7]

It is well worth reading and contemplating the 14 views of the contributors to that section of the conference as well as John Disinger's summary of his own study. For I cannot - in the space and time of this presentation - do justice to the intent and content of their powerful and reasonable papers.

I do not however find solace in the practice that I find over in the United States, namely that for the most part the practice in most states (therefore schools) is as Cheryl Charles, in her report to the conference noted below, sees it: the teaching of conservation is discretionary. I would hold that a curriculum adopted by a Board of Education is non-discretionary, it is every teacher's responsibility to teach it in the curricular intent and the mode of instruction carefully designed for the purposes of schooling. Indeed, as Iozzi (1988) puts it "environmental concepts appropriate to the discipline must be actually written into the curriculum to insure that over the course of the child's schooling, he or she receives a full environmental education". Thus he insists on a non-discretionary approach whether environmental education is infused, inserted, or integrated. So does Hammond.

So too Ian Robottom (1988) who puts it straightaway. He states: "While I recognize the strong philosophical justification of environmental education as diffusion, I believe I have seen more "successful" EE provision in the form of separate subjects"[8].

Indeed, I find myself baffled. We can muster adequate evidence that a failure to legislate the conservation of resources, of the conservation of life, to halt chemical pollution, and pollution by organisms such as bacteria and viruses (even when they pollute hypodermic needles or blood supply), to legislate the use of pesticides, of toxic wastes, of runoff, of exhaust from smoke stacks and exhaust from automobiles resulting in varieties of eutrophicating devastation, a possible greenhouse effect - and annihilation. Yet we argue whether the vital curricular and instructional materials of conservation should be infused, inserted, or integrated. The schooling and education of our young in conservation is undeniably an obligation and requirement of a civilized society. It is part of its obligation, its permanent agenda. And we who are members of a professional Conservation Education Association, and thus its proponents are obliged to place it high on society's permanent agenda and of course, ours. Whatever the mode of schooling in conservation we require it to be non-discretionary. And I would insist that it be a mandated course of study easily identified by intent and content. Why? So that qualified teachers may be prepared: teachers of conservation of equal status with teachers of other areas valued by society. Conservation of the planet's life, however the term is stated, must be as pervasive in our conduct as in our language. That is to say, teachers of English may argue that English must be infused in every course of study, but they also insist on courses of study "called English". That is because English is necessary to carry on the discourse and economic, social, political life of the country - if not private family affairs. So too is the thought and action we call conservation.

I put it to you that the governance of conservationis not only local, state and national, but also prominently and permanently global. Our gene pool is global; our resources are global, we are inhabitants of a global village.

A CONCEPTUALIZATION OF CURRICULUM AND INSTRUCTION FOR A POSTINDUSTIRAL WORLD

The conceptualization of the kind of curriculum for which we are responsible as a Conservation Education Association has a vast scholarship and literature. Those who would create such a curriculum in conservation are bound to suffer from the need to put a time-limit on discussion-for the need of such a work is urgent. But I think that we would find it worthwhile to consider several lines of thought and action.

Should we not consider that we know enough about curriculum to order its content into major foothold ideas or conceptual schemes, based on supporting scholarship and evidence?

Perhaps we would agree that a reasonable amount of knowledge, attitudes and certainly skills in conservation be based in experience in observation in field and laboratory and even experiment; that what James Bryant Conant of Harvard called "well-ordered empiricism" (synonyms: observation, experience, and experiment, investigation, inquiry) be richly

encountered; that the historical record conservationists prize be not set aside in the mistaken impression that all experience is "hands-on". No scientist or scholar - or conservationist - would dream of disregarding those upon whose shoulders he or she stands; those whose minds have changed our minds. Experience may also be enriched in contemplation of the traditional and oral record; reading is "doing" as is "brains-on" activity and imagination. Thinking, that is.

Perhaps we would agree that of all fields conservation draws on all congruent fields of experience - the sciences, social sciences, social studies, mathematics, languages, arts and humanities. In a word, it is the most interdisciplinary of studies. To name acts that require the conservation of life, of renewable or non-renewable resources, of the humane and just treatment of organisms, plant or animal, of those acts that seek to conserve lands, waters, airs, towns, or cities (within the parameters we would call conservation) is to name congruent acts that call forth the sphere of the human armament in knowledge, attitudes and skills that use the resources of all fields of knowledge. Thus to make the point, a curriculum in conservation would require instructional materials rooted in the following:

The sciences: i.e., biology, chemistry, physics - and geology and space science

The social sciences: i.e., history, economics, anthropology and sociology, economics, certainly a view of politics and legislation

Mathematics: i.e., measurement estimation and probability, statistics - and the manipulation of the computer

The arts: Certainly the paintings of nature, the poetry, the literature, the varieties and modes of music, the architecture of parks, landscapes and buildings would be considered

The humanities: (so often disregarded in schooling) For the conceptualization of truth, beauty, justice, love and faith (not necessarily religious) are often set aside.

Thus, the reasons why conservation is so perennially part of the agenda of life and living, and so integral a part of our permanent agenda is that the concepts rooted in the areas of knowledge so hurriedly sketched above abide throughout our lives and the way we live them.

As we examine briefly various agenda in curriculum and instruction in the areas we call conservation and environment we find an ever-increasing literature.

The limitations of time, space and your patience induce me to stress five - not all - "post-holes" that would serve by way of suggestion to tether our initial probe. But these probes are an earnest of a determination to place conservation and environmental education in the permanent agenda of schooling. That is to say, the curriculum in conservation we should consider is one that melds schooling and education. It is to say, that even as we undertake to develop basic concepts in conservation that are the predictive generalizations which will be the cerebral envelopes for future experience, we derive these generalizations from the events currently taking place on the planet we inhabit. That is, current events melded to the relative permanence of predictive generalizations.

Certain "Post-holes"

First, we are required to consider that the Econiche of the humans is no longer at the apex of a certain dominance of a "natural environment" but a "technological-industrial" one as well. We stand at the apex of the Econiche.

It is clear that the elements of this Econiche cannot - indeed should not - be presented as rote. It is a representation of a plan for instruction (curriculum) and a plan of instru n (teaching and learning) in conservation in the Posti trial era. Curricular and instructional materials stemming from it would be developed over the decades. But certainly, by the senior year, our young would be able to analyze and synthesize such a schema and transmit it in amplified and greatly corrected form.

Second, utilizing some such schema as the Econiche as a model, a plan for and of instruction might be developed.[9]

I borrow heavily from existing plans (not only plans from studies prior to 1987, but also the plans made available to me when John Disinger asked me to introduce the 14 proposals of the sympoiasts described in the study below.) I

should qualify my remarks in only one aspect: It is imperative that any studies in conservation and/or the environment be non-discretionary in the schooling of the young.

This would mean, in turn, that teaching of conservation or, if you wish, environmental education, would be obligatory, recognizing, of course, the teacher's obligation to modify the manner and sequence of the experience to suit the conditions of teaching and learning for the variety of learners. For a curriculum to be non-discretionary simply means that at a suitable time within schooling the young would have acquired a given concept and the processes of inquiry by which it is learned in form sufficient to apply it - and explain it in suitable form. With this caveat in mind, it is entirely feasible

a) To infuse the concepts and processes of conservation and/or environmental education in all pertinent areas during the elementary years

b) To develop a program invested in a half-year or year of sequential study during the middle school or junior high school (6th, 7th, 8th grades) years. One of numerous curricular plans that exist (and one intended for the three junior high school years) is that of the "Human Habitat Study" sponsored by this association during the 1983-1986 period.[10] Incidentally, the curriculum is interdisciplinary and draws from conservation studies based in science, social science, and the humanities. It is also well to underscore the observation that there is ample curricular and instructional time available in the 6th, 7th, 8th grades.

c) To develop a program invested in a half-year or one-year course for seniors parallel to the oft-given "Problems in Government" possibly titled "Problems in the Human Habitat".

Nonetheless, by the senior year, students readying themselves for the world of semi-independent life at work (whether in industry, corporate life, or college) are ready for serious contemplation. They are, in my experience, also ready to consider the moral environment in which knowledges, attitudes, and skills are planted, transplanted and fixed. Because of past experience, they are able (or should be able) to compare the different sub-cultures they have studied in literature and in history.

I've had some experience (during 1978-1980) with trials of a course of study titled:

The Environment: In Continuing Crisis[11]

It consisted of three compensatory parts:

A. The Continuing Crisis: Shortage for Life and Living

B. The Continuing Crisis: Quality of Life and Living

C. The Human Econiche: Living with All Life

(Note these heads are couched in the language of the conservationist. If I've missed, then the "heads" require changing.)

Section A constituted these concepts:

1) Prospect: Population
2) Prospect: Human Nutrition
3) Prospect: Energy
4) Prospect: Industrial Nutrition (Minerals)

Section B, the following:

1) Prospect: Prolongation of Life
2) Purity: of the environment within the environment
3) Privacy: within the environment
4) Psychological Safety and Psychological Freedom
5) Principle of Minimum Suffering

Section C,

1) Sanative Environments: Connurbations and Cities
2) Sanative Environments: Wilderness, Preserves and Parks

The interested curricular worker may find it useful to

examine the "curricular plan" developed in extended form in the study described in the footnoted reference #11. Here I need to report that the subsection "Principle of Minimum Suffering" was of particular interest to students. It brought forth discriminate thought and often passionate discussion. It is clear that the impact of misunderstanding and therefore misuse of life brings forth a moral response. As we shall see, once a "principle of minimum suffering" is invoked the rightness of an action submits to other standards than the rigorous search for verifiability. For instance, there is embodied in that principle the rightness of compassion - of mercy. Not that scientists - as human - do not feel and act these emotions but in the rigorous prosecution of accuracy a certain detachment is useful. But in the conservation of life, say of removing "sludge" from the fouled feathers of sea-birds caught in an oil-spill, detachment is not easy.

THE "CULTURES" OF THE CONSERVATIONIST

That is to say, the teaching of conservation of the human habitat focuses on the human as the dominant inhabitant of the Global Econiche. It places on the human a truer perspective on his/her function as a conservationist. Curiously, it becomes abundantly clear that conservation is one of the few studies that can, and should emancipate a teacher from a study that rotates around a narrow conception of the boundaries of knowledge inherent in what was once known as the two cultures: the two worlds of the scientist and non-scientist. C.P. Snow has reflected on the gap in communication between the two and comments on the polarization of the two cultures. While no longer as true as it was at the level of mature scholarship in the sense of the time when he probed the issue, it is still true that in schooling the polarization remains and the gap is wide. Thus Snow comments sadly that

> "Closing the gap between our cultures is a necessity in the most abstract intellectual sense, as well as in the most practical. When these two senses have grown apart, then no society is going to be able to think with wisdom...
>
> Isn't it time we began? The danger is, we have been brought up to think as though we had all the time in the world. We have very little time. So little that I dare not guess at it."[12]

Again we note that the conservationist willy-nilly already has a durable fooothold in both cultures. Not only in their valuable conceptions of "truth" that the two cultures may embrace but in the range of the meanings that are within their spheres.

Recall that the richness of the field of conservation enabled us to traverse the realms of cultural evolution (the ways of our current life an living) and note unfailingly that the cultural components of conservation supported biological evolution (the ways of our past life and living). Now it is that we find that our feet are planted firmly in the thought and action of what Snow calls the two cultures: science, on one hand and the arts and humanities on the other. These turn out to be no less than what are perceived to be two different ways of determining how we know what we know - but, in effect, these ways do show a relationship.

Thus Jacob Bronowski (1956)[13] tells us rightly that the criterion of what we may accept as scientific knowledge, that is, scientific "truth" may be put thus:

"We OUGHT to act in such a way that what IS true can be verified to be so."

He posits that this is the principle undergirding the society formed by scientists, a long-lasting society.

But the discipline Conservation not only embraces the discipline of science but is a study that goes beyond the discipline in embracing what is often placed in the sphere of the humanities and the arts.

Thus, we are required to consider another validation of "truth" in the search for a behavior that is tolerable as we probe events critical to our desires, aims, and actions that do not have the clean evidentiality of settled inquiry but require solution nevertheless. But there is a corollary.

Jerome Ravetz examines the notion of verifiability from the viewpoint of social problems. Thus he assists our thinking as he probes a different conception of the "truth" of solutions of problems in the sciences of society.

"The objects of scientific inquiry are classes of intellectually constructed things and events, the evidence for those properties is derived from particular experience ... A scientific problem is thus incapable of having a solution which is "true". Rather the solution will be assessed for adequacy."[14]

Note the title of Ravetz's book: he was assessing scientific knowledge and its social problems. Our search in developing models of curriculum and instruction in conservation is directed towards solution of numerous scientific and social problems that may be stated in this context: The building of a sanative environment in response to problems that are not yet in the stern human art of the verifiable, but in more tender areas of certain social and humane values the conservationists would foster. Nonetheless, certain validity in those areas may be found in the territory of "adequacy". Namely, does the solution work? Indeed, those who are students of the road of development of the cumulative knowledge of science will indeed find that the road traveled in any field of science began with adequacy of a particular body of information before that information was ordered into concepts through the rigorous processes of verification.

Thus in adhering to a "principle of minimum suffering" whether of particular organisms or of ecosystems we can engage in practices that work toallay the "suffering" - a form of validation. Meanwhile, the conservationist, as scientist, may proceed with the rigors of verifiability. And in so doing redirect and strengthen the adequacies of the solution.

Curiously, the culture of the conservationist is steeped not only in social problems but in the humanities as well. A vast literature in innumerable works of art and music, in essay, novel, and poem, has nurtured our understanding of the universe that is the life-blood of the conservationist's art-science. Conservationists may easily see an aspect of Walter Savage Landor's life in his lines:

"Nature I loved
And next to Nature, Art."

In contemplating nature, we know without need of explanation what Keats meant when he affirmed:

"Beauty is truth, truth beauty."

And we know without need for adjectival phrasing what Albert Schweitzer meant when he affirmed steadfast and ineffable faith and justice in three words: respect for life. Scientists (who may also be conservationists) seek a verifiable, orderly structure within the universe. They seek hidden likenesses within the most unlikely structures: mountains and tables (atomic structure everywhere); between elephant and mouse, and oak and lily (not only atomic structure, but cells as well). Experience and experiment bring forth the marvelous orderliness hidden in the universe. But naturalists (who may also be conservationists) need not - unless their art-science so insists - delve beyond the observation and expectations of the senses. The orderliness of sequence in seasons, the predictive habituations of the gardener who lives in visions of an expected march of beauty in form, color, sound; the predictive generalizations that an ecosystem yields to the naturalist bring similar validations of a marvelous orderliness, pervasive and breath-taking in its sweep. And this marvelous orderliness endows us with antidotes that defy the meaninglessness and purposelessness too often played out in the fantastic, mindless acts of individuals within the species of the particular primate that is central to our Econiche.

Consider now a fable: it may play out its course in the kinds of wisdom we prize. Consider a magnificent huge bird; let's call it a condor. Consider too its imminent departure from the roll of living species on this our endangered planet. Consider now a band of conservationists - a gathered people - out of a variety of disciplines, but all determined to outwit an

> apparent destiny. Their armament: a knowledge of two sets of orderly events. One sequence is set in the bird's embryology and development as well as its adaptation to a particular ecosystem. The other set is their analysis and synthesis set in the kinds of hazards to full restoration of the bird's habitat requirements. Their armament, as well, rests in a conviction that their behavior is not only sound in its science and art, but also in its ethics. Painstakingly, they collect

the eggs; they are mindful of the obstetrics of the condor egg; they peel off bits and pieces of the tough eggshell to assist the "breaking-out". Then, mirabile dictu, they also create a puppet-head, unmistakably scupltured condor-like. And it is this remarkable head and beak, hiding the human hand that manipulates it, that greets the ravenous chick and feeds it a most acceptable diet. So the chick is imprinted by human artifice. What may we say of the behavior of these dedicated men and women?

Perhaps this: Theirs is part of the essential meaning of the term conservation - to conserve, to restore an endangered species. Theirs is part of the craft of the conservationist: to consider the evidence, and to blend it with judgment and reason - and where these seem wanting, with a certain instinct of those who understand "that marvelous orderliness that is a final refutation of purposelessness (Hans Zinsser's phrase). Their craft also has a base in the common-sense of the scientist, naturalist, and ethicist: it blends the insights of innovation with those of tradition. In tradition, to consider that which has been inherited; in innovation, to reflect on present custom and to blend it with a future prospect.

In this act - great and good in mind and spirit - an act that defies what was to be the inevitable history of the bird in its invaded environment. Yet is it not one act essential to a whole that defines a permanent agenda? Is it not but one search, among so many by which we seek to discover the meaning of life, and a meaning in life, and a way to sanction experience in search for meaning? Is not the tale of the condor the tale of our own odyssey: A sanction for a purposeful human agenda?

Wendell Berry has written of Jean Giono's The Man Who Planted Trees[15] - a story of Elzeard Bouffier. Simply it is the story of a farmer-shepherd who responded to the desolation of his native Provence in France. How? By planting trees. Each day, for thirty years, he placed one hundred acorns in the barren soil. He was careful and strong in his duty. So do other plants. So do animals. And so Berry has written of Giono's book as one that tells of the "best that can be said of our species".

For our species, have we not taken up the collective name: Homo sapiens? If we do not live up to that name, will we prevail?

Will we then ourselves outwit a cetain-

time - and a certain place?

END NOTES

1. Edwin O. Wilson quoted in Walter T. Anderson To Govern Evolution. Further Adventures of the Political Animal. San Diego: Harcourt Brace Jovanovich. 1987.

2. I used to construct "ecology of achievement" in Memorandum: On Renewing Schooling and Education (Harcourt Brace Jovanovich, 1982) to denote the kinds of interaction that governed a school, i.e., a school was part and parcel of the variety of communities which embraced it. A school was never independent - as the myopia of the critic would have it.

3. Daniel Bell The Coming Post-industrial Society: A Venture in Social Forecasting. New York: Basic Books, 1973.

4. Norman Myers, The Sinking Ark. New York: Pgamon Press, 1979.

5. In my function as Director of Education of the Con servation Foundation; as Adjunct Professor, Con servation and Education at the University of Pittsburgh; and Director of Research (and Director of the School Department) at Harcourt Brace Jovanovich, Publishers.

6. Gregory Bateson (1979) Mind and Nature. A Necessary Unity. New York:Bantam Books.

7. Excerpted from an introduction by Paul Brandwein Environmental Education in the School Curricu lum (How) Does it Fit? By Way of Beginning: 14 Scholars, 14 Views. Published in Environmental Education Information Report: Trends and Issues in Environmental Education: EE in School Curricula. John F. Disinger, editor. ERIC Science, Mathematics and Environmental Education Clear ing House in cooperation with Center for Science & Mathematics Education. The Ohio State Univer sity, Columbus, Ohio, December 1987.

8. Op cit., #7.

9. We should note that this schema came out of early study by a committee "The Human Habitat Study" of the Conservation Education Association in 1983. It is, in a sense, a precursor of numerous curricu lar plans under the rubrics of Science, Technology, Society circulated since 1985 to the present.

10. The curriculum is now in the Archives of the Human Habitat Study" Committee. William Hammond, Chair

11. Certain of the curicular principles, somewhat changed - certain of them deleted - were first described and extended in a study originally commissioned by the Association for Supervision and Curriculum Development, James John Jelink. Based on "Science and Technology: Humane Purpose and Human Prosepect". Paul F-Brandwein. In Improving the Human Condition: A Curricular Response to Critical Realities. ASCD 1978 Yearbook. pp. 94-128.

12. C.P. Snow The Two Cultures. New York: The New American Library. Mentor Books. 1965.

13. Jacob Bronowski, Science and Human Values. New York: Harper and Row. 1956.

14. Jerome Ravetz (9171) Scientific Knowledge and its Social Problems. Oxford: Oxford University Press (p. 153). As quoted by William W. Lowrance (1986) in Modern Science and Human Values. NY: Oxford University Press.

15. Jean Giono, The Man Who Planted Trees. Cahill & Co., Lake Bluff, Illinois. Adapted from a review in Cahill's Reader's Catalog, Summer 1988.

REEP: Environmental Education Curriculum Development and Implementation

Dr. Richard James

It is always a pleasure to visit Philadelphia's next suburbs, assuming, of course, New York does not get there first. We're coming! The air pollution up here is so much more refreshing than what Philadelphians are currently experiencing. I'll bet the birds up here do not cough when the sun comes up.

When I reviewed the program's list of speakers, I was slightly puzzled about what it was CEA wanted to hear from me. The question I framed was much like the dilemma facing Zsa Zsa Gabor's eighth husband. I know what I have to do. The question is can I make it interesting.

I think I can make it interesting. Perhaps the real question is ... can I reach my car before you do? Environmental education curriculum development is a subject that has all the excitement potential of watching paint dry, with a slight edge to the drying paint.

There are a couple of "zingers" buried in the title. What is environmental education and how many of us would recognize a curriculum if it bit us?

The EE solution is simple. It is a separate curriculum component. It stands alone. It is not part of anything else. It is a core of a curriculum. It has a beginning, middle and an end.

It should not suffer the sad fate dealt to outdoor education when it was decideed to integrate it into existing subjects in an existing curriculum. Outdoor Education avoided the fundamental issue that our schools teach the patterns of society. The furnace for the great American melting pot is the American education system. We ask the system to teach what is worrying us the most. It used to be sex. Now it is AIDS, drugs and, probably, literacy. Sex was more fun.

A curriculum is a whole " 'nother" problem. A curriculum has obvious characteristics. It looks like a curriculum. It
sounds like a curriculum and not infrequently, it smells like a curriculum.

Nancy Christie, Director of SCEE's REEP program gets a deep bow and full credit for the following parameters into which a curriculum must fall.

I. Establish the design criteria:
What are the parameters within which the curriculum must fall? Some of the factors to be considered include:

A. Time: Length of program; travel time; time available to participat ing audience; time to "set up/ tear down", etc.

B. Staff: Who is going to teach? What training is involved for the center staff as well as the teacher? What is the teacher (staff) / student ratio?

C. Budget: Any financial constraints to be aware of in the curriculum design and implementation? What will be the cost to the par ticipant? Can they afford it?

D. Materials: In general, determine how "prop intensive", remembering that materials must be made/ brought, repaired/replaced, stored, etc.

E. Audience: Specifically, who is the curriculum for? Identify grade level(s), backgrounds of participants—urban, rural, affluent,culturally deprived; number to be serviced at any one time, etc.

F. Seasonal Factors: When will the curriculum be offered?

G. Indoor/Outdoor: Determine which or both, and then consider the implications regarding clothing of participants, weather, etc.

H. Timeline: Amount of time available before the curriculum must be ready to go "on line".

I. Location/Facility: Where will the curriculum be taught? Any constraints posed by the site/facility?

J. Geographic Area: Identify the area to be serviced. I was always fascinated with textbooks used in inner city schools that featured chapters on "contour plowing value". My guys at Edison thought that was in the "say what?" department of learning.

K. Teaching Learning Strategies: (Demonstration, lecture, hands-on, small-group, individualized, etc.)

L. Pre/Post, or one experience?

II. Identify Concepts

A. How does the curriculum fit into the bigger picture? How does it complement/supplement what is already being offered?

B. What is the overall goal?

III. Identify Concepts

A. Concepts are statements of fact. They are the "big ideas", expressed in complete sentences. Because concepts are very often intangible, and may require several activities to develop adequately, care should be taken in selecting an appropriate number to teach in the time available.

B. When more than one concept is to be developed, there should be a logical flow from one to the other.

IV. Behavioral Objectives - The Dreaded (B.O.'s)

A. Each concept should have one or morebehavioral objetives associated with it. These objectives tell what a student is able to DO as a result of being exposed to the curriculum.

B. B.O.'s always begin with an action word, such as: state, list, identify,define, write, construct, demonstrate,illustrate, etc.

V. Activities

Select activities which teach to the behavioral objectives. Each B.O. should have at least one activity associated with it.

VI. Suggested Content/Format, with other factors that should be included.

A. Title

B. Goal

C. Grade
D. Concept(s)
E. Behavioral Objectives
F. Activity #1
    1. Time
    2. Site
    3. Materials
G. Activity #2
    1. Time
    2. Site
    3. Materials
H. Activity #3, etc.
    1. Assignment
    2. Evaluation

Remember, the basic rules, first establish the concepts and objectives, then select the appropriate materials which teach the objectives. These guidelines are a concise summary of Dugan's First Rule of the Laboratory..."when everything else fails, read the instructions".

The above criteria means that materials such as OBIS, the various forms of Project Wild and Project Wild Aquatic are not curricula. There are lots of other EE and outdoor education material that belong in this distinguished list, but this brief attack will do nicely.

Some material from the Institute for Earth Education deserve recognition as valuable EE curricula. Their basic construction includes concepts and activities to get you there. They are battle tested and get results from the students who use them.

Our experiences with SSE and Earth Caretakers with the North Penn School District provide excellent qualitative and quantitative evidence for student learning and retention. The NPSD has maintained a five year contract for SSE and ECT with SCEE because the administration and the teachers feel the program contains all the elements of their EE program for their 800+ 5th graders.

The programs are material, staff and space intensive. It is a real staff killer. Site use causes severe impact. The SSE learning space needs TLC and periodic rest.

But, it does teach concepts. The students learn and they retain what they learned.

To this list must be added the Philadelphia Electric Company (PECO) Energy Education Advisory Council (EEAC) whose ten year long effort to develop and introduce energy education materials for pre-school through college has resulted in the largest energy educatin effort in the country. The material is developed, tested and evaluated by a core of 40 teachers, administrators and college professors from the PECO service area which contains a market of some 11 million people.

The Commonwealth of Pennsylvania EE efforts are notable because of its longstanding lack of leadership and piecemeal approach to its environmental problems.

Its approach to environmental understanding has been based on a recreation guide to the state's mine acid drainage patterns-where to dissolve your boat; a topic rarely mentioned in state publications.

We concern ourselves with acid deposition without factoring in mine acid drainage, but then it has only affected 3000 miles of the Commonwealth's streams. We host the largest EPA recognized inland oil spill in the country in Warren County in northwestern Pennsylvania...an area who boasted it was easier to get a drilling permit than a deer license. Philadelphia has lost New Jersey as the dumping ground for its solid waste. We lead the Nation in cost per tone of solid waste disposal. Of course, we do ship all around the world. There are a host of other concerns that were ignored as educational opportunities in favor of where to camp and hunt...great topics for a state in which 60% of its population is croded into five southeastern countries. The remaining population unevenly divided among the remainder of the state's 67 countries.

We are making good progress. Under the leadership of Dean Steinhart, our Czar of EE, Pennsylvania is making some important and solid inroads. There is always hope.

Finally, I would like to present a brief review of the experiences of SCEE with curriculum material development during the 23 years of its existence within the City of Philadelphia. We "live" on a five hundred acre tract in the northwestern section of the City. We are nine miles from center city Philadelphia. The Center is privately owned and operated. We receive no support from any taxing agency, local, state or federal. What we earn, we spend.

Our first large scale EE curriculum effort was called EEPPS (EE Project for Philadelphia Public Schools). It trained 150 teachers in a three two-week summer workshops (50 teachers per summer) to use materials they developed in a series of year long workshops.

We established in 1975 a Teacher's Resource Center (TRC) which today contains over 5000 volumes, computers, audio-visual, video and other teacher aids. It is open 7 days a week to any teacher in any graduate or curriculum program at SCEE.

The program was great success until the district fired or laid off 75 of the teachers and changed the curriculum. Happily, a aimilar program for teachers of the handicapped has survived and enjoyed a great acceptance.

All of our curriculum development projects have been built around teacher training, graduate study, resource centers, year-long workshops, support staff and on-site workshops and training sessions for the teachers and their classses.

SVNC's latest efforts, the EcoVan and REEP follow the basic formats of need assessment, budgeting-funding and development.

The EcoVan is a 38 foot mobile classroom equipped to teach the principles of water and water use to as many as 200 children a day. It requires teacher workshops, it carries its own lessons or can easily meet the requirements of the classroom teacher. It has six work stations inside including two computers which supply interactive programming and data base capabilities. The exterior of the van can be converted into a wet lab for field work. Thus, a class is divided into a field group and a lab group. The class then "flips" modes and completes the planned lesson. It is basically a support learning module.

It is not a full EE curriculum device.

REEP(Regional Environmental Education Project) was designed to create a full K-12 EE curriculum for the schools of five county southeastern Pennsylvania area.

It started in 1984 and in the 4.5 years of its existence, REEP has trained over 200 classroom teachers, is in the process of printing the first six units and has been expanded to include two additional counties in south central Pennsylvania and the eight counties comprising the southern New Jersey area.

The following overhead graphics include the scope and sequence of the program and a typical unit format with ten lessons of the unit outlined.

It is sad that private organizations have to fill the gap left by the colleges and universities, but fill it we must. The only word of advice I can offier is...enjoy.

Thank you.

BIG NEW IDEAS — WHERE ARE THEY?

by Robert Rodale

Ideas can be judged or categorized in four ways.

The first is quality. You can ask whether an idea is good or bad. Or whether it is primarily suited for use in good or bad ways.

Second, ideas can be categorized by subject. Some apply to one area of human culture. They are used primarily by members of one profession, or a sharply defined group of thinkers or workers.

For example, the idea of deconstruction is a form of literary criticism.

Existentialism is a philosophical idea.

Quantum mechanics is part of the theoretical foundation of modern physics.

A third way to categorize ideas is by their age. Some are new, like the concept of chaos. Others, like monotheism, date back to antiquity.

Then there is size. Ideas come in different sizes. Some are small, others medium-sized, and a few are big.

The big ideas reach well beyond a subject area. They may originate in a discipline, but almost immediately begin to influence thought and action in other areas. Big ideas not only spread beyond the confines of a subject area, they eventually become the glue that lets people link smaller thoughts into a generally understood approach to life.

Our culture is built of ideas of quite different size. We use many small ideas. Another group of ideas of medium size. And we rely on relatively few big ideas.

All good ideas — regardless of their reach or scale — are by definition of value. But if a culture has invented and is using many small ideas, but lacks a flow of new ideas, it may begin to go stale. And eventually to weaken. That is my premise.

We are in that situation today. There are available for our use a certain number of what I call *big ideas of general usefulness*. But we don't have enough new and fresh ones. Our thinkers are increasingly grouped together in tightly-knit bands, working in specific subject areas. They are being taught to invent and use small ideas. New big ideas are being generated slowly. Why? Because our culture lacks sufficient free spaces for general thought.

That, essentially, is my argument. I will begin to develop that argument by putting forth for discussion examples of ideas of various sizes. Because much of my work is in the area of productive use of the land, I will select as examples ideas rooted in agriculture and the care of the natural environment.

However, a small idea first.

Some plants can send powerful messages to other plants. Farmers have known about that effect for centuries. The value of crop rotation is based to some extent on the chemical messages that one crop can send to another growing the following year. And especially the power of some crops to exude chemicals that discourage weeds in following crops.

Oats have that power. Forty years ago on our farm we grew oats in the rotation to reduce weed problems in other crops.

Science in recent years has identified other plants. And the effect itself now has a name — allelopathy. More than that, allelopathy has become an idea. Agricultural scientists now use it along with other ideas for weed control, like cultivation and use of herbicides.

But as useful and powerful as allelopathy is, I classify it as a small idea. Agronomists and weed scientists still don't know about allelopathy, nor do they have reason to use it within disciplines like post-harvest technology or food processing. Allelopathy is likely to remain powerful within a rather sharply defined area of knowledge and application.

Now, for an example of a medium-sized idea.

Environmental Restoration is interesting to think about. The idea that a natural area that has been degraded or even destroyed can be restored. Rivers and streams are being restored. So are praries and some forests.

What is restoration? It is a series of informed and deliberate human acts aimed at causing a degraded natural area to return to its orginal condition.

A good idea, and quite useful. Books and articles are being written about restoration. About a month ago *Time* magazine ran a two-page article about the restoration movement. We are all enriched by the thoughts and actions of the restorationists.

How big is environmental restoration as an idea? I put it in the medium-sized category. Medium because it requires multi-disciplinary research and combined action by people with a variety of kinds of knowledge and skills, but it is still somewhat linked in total area of application. Even though restoration is an extremely valuable idea, it does not reach out into all areas of thought and action.

Conservation is a big idea. Maybe not the biggest of big ideas, but still definitely in the big category. And we can easily trace its history.

The word "conserve" was first used in the 16th century, to mean "preserve". The word, "conserve" later described a store. We are probably all familiar with fruit conserves — a jam made to avoid the waste of fruit. And, in an environmental sense, the word conservation began to be used in specific situations in the late 19th century.

Then, early in this century, Gifford Pinchot, created the concept of a conservation movement. Pinchot also gave to conservation the status of a big idea of general usefulness. He describes that process of creation in his autobiography, *Breaking New Ground*.

"At the beginning of 1905, when the Forest Service was created, the twenty-odd Government organizations in Washington which had to do with natural resources...were all in separate and distinct watertight compartments."

They were the Agriculture Department, the War Department with its Corps of Engineers dealing with floods, stream flow and inland naviagtion. And finally the Interior Department, which ran the Geological Survey and the General Land Office.

"It was a mess," Pinchot wrote. "A mess which could be cured only by realizing that these unrelated and overlapping bureaus were all tied up together, like the people in a town. The one and only way to bring order out of this chaos was to supply a common ground on which each could take its proper place, in co-operation with all the rest."

Gifford Pinchot rationalized the confused natural resource use problem by creating a new big idea — conserva-

tion as a movement. Not just conservation of fruit by making jam, or conservation of water during a shortage, but conservation as a unifying and powerful big idea of general usefulness.

He even tells us exactly where and how the idea came to him. It was not far from here, as a matter of fact, in Rock Creek park, "in the gathering gloom of an expiring day," during the winter of 1907, on the back of a horse named Jim.

He was riding on Ridge Road, "taking his problems with him." Then it happened: "Suddenly the idea flashed through my head that there was a unity in this complication — that the relation of one resource to another was not the end of the story...all these separate questions fitted into and made up the one central problem of the use of earth for the good of man."

The rest, as has been said many times, is history. A world movement is born. And it was a broad movement, touching first forests, but then agriculture, public health, mineral use, industry, waste disposal and parks. Almost everything people have done and thought about since 1905 did or could draw inspiration from the conservation concept.

Conservation caused great things to happen for about 30 years. It is still causing a few good things to happen. Energy conservation is still promising and necessary. But in the broad sense the idea of a conservation movement is old and tired. The word itself no longer causes our hearts to beat faster, as it once did. The blind alleys and dead ends are too visible.

Look at the Soil and Conservation Service. It was created as a maker of bandages to place over the open wounds on the land created by agriculture. But many are failed bandages. And the most effective erosion preventive — conservation tillage — requires the use of vast amounts of herbicides to control weeds. The very herbicides that are now seen as one of the most serious of all environmental problems. Laws are being enacted to restrict or eliminate their use.

Big ideas of general usefulness have a life span, just like people, or like industries. They are born, grow, mature, and eventually die. At some point in their life span they are more useful than at other times. And they can revive, and return to youth if conditions change. The invention of non-polluting herbicides might revive conservation, and reinvigorate the Soil Conservation Service. Or maybe agriculture will change fundamentally, allowing farmers to farm in new ways that actually make the soil better rather than worse. Then the idea of conservation, as applied to agriculture, could become totally obsolete.

EXAMPLES OF OTHER BIG IDEAS OF GENERAL USEFULNESS

I have been thinking about big ideas in this specific way for only a few months. But already I have filled seven or eight pages of a small notebook with examples. And almost all of the big ideas that pop into my mind share with conservation the close association with one person — often the originateor of the idea.

Here are some ideas from my list, with the names of people associated with them:

Natural selection and evolution — Darwin
Communism — Marx
Christianity as a religion — St. Paul
Mass production — Ford
Holism — Smuts
Psychoanalysis — Freud
Sanitation — Lister
Chivalry — (the mythical) King Arthur
Entropy — Carnot
Temperance — Amy Semple McPherson
Quality in manufacturing — Deming
Revolution — Copernicus
Paradigms — Kuhn
Existentialism — Sartre
Structuralism — Levi-Strauss

At least one of those big ideas — chivalry — is probably dead. Temperance does not have much life in it. Communism seems to be on the decline, but that could change. Interest in quality is very much alive at the moment.

Existentialism is at the very least out of fashion. And Claude Levi-Strauss now renounces structuralism — described in the December 21, 1987, *New York Times* as "the search for underlying patterns of thought in all forms of human activity." Levi-Strauss now says the term has become "too ambitious in the claims made for it."

How do ideas get on my list? What characteristics differentiate a big idea of general usefulness from smaller ideas?

Ideas must pass a series of seven tests to convince me they are big:

1. Usefulness. The idea must be useful. That doesn't mean the idea has to be <u>used</u> primarily in good ways. At this point I'm trying not to get tied up in an effort to make value judgments. Usefulness is enough for me.

2. The idea must be general, or at least appealing to generalists. That's the whole purpose of big ideas. They are of general usefulness, and can give those generalists who understand them an advantage over specialists.

3. Big ideas must exist in both an abstract and a practical sense. They have to be able to fill a spectrum ranging from theory at one end, to specific practice at the other.

4. Be of at least some interest at all levels of human concern with ideas. Big ideas should not just appeal to leaders and makers of policy. They should be grist for teaching to children, and for use in the household.

5. Big ideas are geographically and culturally extensive as well. They are or can become significant themes in life in both East and West, North and South. You find them in homes in primitive cultures, and in apartments along Park Avenue.

6. True big ideas can't be encompassed or confined within one academic discipline. Nor do they spring from one limited area of human activity or thought. They are pulled out of intellectual soup cauldrons.

7. Finally, they must not be of one moment. Big ideas are not the theme of the month, or the concept of the year. They have life over an extensive period of time. Yes, they can die or fade away. But usually they last for more than a generation. Often big ideas remain current and useful for many generations. And as I said earlier, big ideas can recede in importance, and later come to the forefront again.

If an idea passes all seven hurdles, it enters the category of big ideas.

REGENERATION — CASE STUDY OF ONE BIG IDEA

I have been working for seven years with one big idea, which I call regeneration. My conception of regeneration begins with the observation that all living systems have ways to respond constructively to disturbance. When they are shaken up in some way, they tend to respond by recovering and often improving beyond their pre-disturbed state — regenerating. And if a living system is part of a production system, we can use regenerative capacity in practical ways.

I am going to tell about the origin and nurturing of the regeneration idea in order to attempt to show how big ideas need big areas of thought and action in which to develop. And, again, I am going to use agriculture and the use of natural resources as an arena for discussion, because that's the original area of my experience and work.

Regeneration has become the central theme — the big idea — around which much of my work centers. We got started with that idea by thinking about how eroded and wasted land gets better when allowed to rest. Modern farming methods often tend to reduce the quality of land over time. Erosion takes place. Soil structure deteriorates. When those processes so weaken the land that it can no longer support profitable farming, the farmer leaves and, in effect gives the land back to nature.

Then the land begins to recover. Some land improves quickly. Some takes many years to overcome abuse. But almost always land in the care of nature regenerates.

My idea was that that regereative capacity of land could be studied and put to practical use. Our goal became to begin to learn exactly what processes occur when land in the care of nature regenerates. We observed specific regenerative tendencies, such as the proliferation of perennial plants in regenerating land. The increase in the number of leguminous (nitrogen-collecting) species, and the fact that the surface of land in the regenerating state is covered with plant material, protecting it from erosion.

We set out to modify agricultural production systems in ways that build into them regerative tendencies. We wanted to give to farmers the same kinds of tools that nature uses to regenerate land. We would not accept reduction in the level of production to achieve that goal. In fact, we felt it would be possible in time to increase production. And in the short run we strove to reduce the use of inputs such as fertilizer, pesticides and energy, in order to cut costs and increase profitability.

The idea of creating a regenerative system of agriculture was first articulated in 1981. Although at first our work with regeneration was limited to agriculture, the idea of regeneration quickly began to show that it had within itself qualities that would not allow it to remain in the small or medium category.

To explain the first stage of the growth of regeneration into a big idea of general usefulness, I need to return to a discussion of conservation and its relation to agriculture.

Conservation and agriculture have until recently been two separate and distinct ideas. And two different methods. Agriculture is the idea and the method of production of food and fiber. Conservation is the idea and the method of protection of the resources used for that production.

Agriculture has a long history of wearing out land. Conservation has a much shorter history, and lately not a terribly good record of success. Over the past 20 years the idea of "conservation agriculture" began to take shape. As I have pointed out, the first techniques of conservation tillage required large amounts of herbicides. They created some undesirable side effects. But there is wide agreement that the process of attempting to combine conservation and agriculture into one method is a good idea; and I think it's a big idea.

Regeneration amplifies the usefulness of that idea and makes it still bigger. It suggests the inevitability of a complete marriage of conservation and agriculture. In regenerative food production systems there are no real distinctions between conservation and agriculture. They are fused into one idea that is bigger in scope than either.

But that capacity to fuse conservation and agriculture into one bigger idea has proven to be just the beginning of the expansion of the regeneration concept. Within a short time it became apparent that regenerative agriculture used regenerative techniques and specifically regenerative types of technology. That opened a fascinating conceptual door. There seems to be no reason why regenerative technologies and techniques could not be invented and used in other areas as well.

Regenerative technologies allow people to make better use of the internal capacity of systems and resources.. They not only conserve value and energy, but are aimed at giving new life to the resource base.

Repair is a regenerative technique. An item that is repaired effectively is given a new lease on life. Invention of better repair methods is one example of work on regenerative technology.

A regenerative agricultural technology is the improvement of perennial grain-bearing plants. Almost all present grain plants are annuals. Because they often require tilling, soil used to grow them is subject to erosion. Perennial grain plants keep the soil covered for many years and in addition, their vigorous root systems are regenerative of soil structure.

Regenerative techniques are now also being used in community development. Several towns in the U.S. have designated themselves regereation zones. Residents of those towns search systematically within themselves for the ideas, skills, information and local resources that can be used effectively for improving community well being.

Another area of work is the development of regenerative techniques of management of organization. That includes specific studies of the internal resources of companies, as well as regenerative methods of training — teaching people how to enhance their internal resources by cooperating more effectively with co-workers.

To the best of my knowledge, several hundred thousand people in the U.S. — and some in other countries — are now conversant with the language and the concepts that allow them to use regenerative techniques effectively.

My purpose in explaining the regeneration idea to you in this brief way is not to argue that it is a good idea. I think it is, but that's not the issue. I present it as an example of a new big idea. We know the origin of the idea, can see its path of development, and can measure the extent of its application. We also can look at the role of American universities in the origin and nurturing of this idea.

Pessimistic views of the university as an institution which fosters great thinking are fashionable today. Like many others, I have read The Closing of the American Mind by Bloom, and The Last Intellectuals by Jacoby. But I am optimistic. I believe that universities still can be places of innovation. They have, to use one of my favorite phrases, tremendous regenerative potential. True, universities have hardened into a disciplinary pattern that causes people to work in ever narrower areas in order to gain tenure and to advance within their field. And it is also true that many university researchers are working to shed light on portions of big ideas that were originated many years ago. But I feel that if ways can be found to bring people in universities into contact with emerging big ideas of general usefulness, and show them the practical uses of those ideas, the situation can change.

If we look at the origin of previous big ideas of general usefulness, I believe we see that many originated either outside the university environment, or at the point where higher education was about to take on a new challenge, or move into a new area.

That happened with conservation. Gifford Pinchot was the first professionally-trained forester in the U.S. He had to go to Germany for his education, because no schools of forestry existed in the U.S. then. He participated in the creation of forestry education here, and invented conservation in the process of doing that.

My feeling is that today conservation is losing much of it steam and its relevance, because the challenge facing us has changed. Our need is no longer to conserve vast resources, but to regenerate the many kinds of resources which now and in the future must carry a much heavier burden of production. We have to create new ways to make our resources base better and more resliant.

Not only do natural resources need regenerating. So do social, economic and political resources. And, I might add, our education and research resources could benefit from regeration as well.

How can we find the path to that regeneration?

My thinking — and as I said earlier I have been wrestling with this challenge for only a short time — focuses on the creation of new kinds of relationships between universities and the rest of society. Let's consider first the relationship between businesses and universities.

Today, businesses are limiting the capacity of universities to invent and nurture big ideas of general usefulness. They do that by putting ever-increasing amounts of money into very specific programs aimed at achieving narrow goals. That situation might be changed if at least part of the support of businesses for university programs were structured in an approach similar to a political action committee. But instead of banding together to support candidates or political positions, businesses would group a portion of their funds to support universities interested in creating free spaces within them to deal with big ideas of general usefulness.

What would those free spaces look like?

I believe they could grow out of today's Science, Technology and Society programs.

My experience with the STS program at Penn State encourages me in that belief. Without the encouragement and criticism of my colleagues in that program, some of the most important elements of the regeneration idea would not be nearly as well developed and articulated as they are today. Rustum Roy, who directs that program, encouraged me from the beginning. Ivan Illich provided useful insight into the spiritual dimensions of regeneration. Larry Spence is presenting a paper at this meeting on regerative politics. Leonard Waks has contributed much to our appreciation of the psychological implicaitons of the idea. And Patrick Madden, a Penn State agricultural economist, is now on leave to the U.S. Department of Agriculture to adminsiter a newly funded program of support for regenerative agriculture at land grant univerisities and private research centers.

The original idea of the regeneration zone — a community motivated to study the resources and the technologies within itself — was as a laboratory for STS research, a way for members of different academic departments to join in studying the community use of one particular big idea. While that vision has not yet been achieved in total, the communities using the idea exist and are waiting to be looked at systematically.

Much work on the regeneration idea at other universities is building a base that could be and is being used for national and even international work on this idea.

Perhaps most important is the work of John McKnight and his colleagues at the Center for Urban Affairs and Policy Research at Northwestern University. They are developing the technique of capacity analysis for urban neighborhood regeneration.

California State Polytechnic University at Pomona is developing an Institute for Regenerative Studies.

And there is now considerable interest in the evolving concpet of regenerative environmental education — presenting the student with a more hopeful view of the environment and inviting his or her active participation in the improvement of the natural and built environment.

In conclusion, I am convinced that there is today a great need for new big ideas of general usefulness. And the potential for the creation of those ideas exists within our culture. They will spring forth and be nurtured and used only if universities create new kinds of partnerships and new kinds of free spaces for thought and study within themselves.

LEARNING BY DESIGN

By Mario Salvadori

The Youth in the City Program of the Salvadori Educational Institute on the Built Environment (SEIBE) is a combined effort of the Institute with the Education and Architechtural Departments of the College of the City of New York and District #10 of the New York School System, aimed at implementing in the schools of the system the methodology developed during the last twelve years by Dr. Salvadori, Professor of Civil Engineering and Professor of Architechure (Emeritus) of Columbia University, and his associates to enchance the knowledge of the school students about their city.

The initial program instituted by Dr. Salvadori, called Why Buildings Stand Up, was limited during the first few years to a presentation of the basics of structural engineering and architectureby means of demonstrations and hands-on model building by the students. As a result of this work the following materials were developed to help the teachers attending training courses given by Dr. Salvadori and his associates:

A child's book on architechture and engineering, called Building and published by Atheneum Publishers, now in paperback by Atheneum.

A layman's book on architecture and engineering, called Why Buildings Stand Up, published by W.W. Norton, now in paperback by McGraw-Hill Book Company.

A teachers' manual on Engineering and Architechure, published by the New York Academy of Sciences.

Eight videotapes, four on Dr. Salvadori's demonstrations in class and students' hands-on work, three on illustration of important structures from all over the world from 8000 B.C. to the present featuring two students and two mathematics teachers, moderated by Dr. Salvadori, who is also a mathematical physicist.

A kit containing all the materials and instruments needed to teach the course "Why Buildings Stand Up," put together with CETA money by the Teachers Union of New York City and fifteen school students.

A tape of scences from the work in an 8th Grade class, taken in Harlem, New York City, during a course given by Dr. Salvadori.

All of the above materials are available from the Institute.

As a result of the interest in Dr. Salvadori's work, the Board of Education of New York City an District #10 have established a Salvadori Minischool in P.S. 115 of District #10, which will teach the regular 7th and 8th grade curricula to 150 "at risk" students, using the methodology developed by Dr. Salvadori in the courses on Why Buildings Stand Up as a connecting link between the courses in English, Social Studies, Mathematics, and Science. The main goal of this endeavor is to give relevance to the curriculum by relating it to the environment in which the students live and which, often, they have never abandoned to visit even the neighboring sections of the city. Educators believe that this approach, used for the first time and starting in September of 1987 at P.S. 115, will increase the interest of the students and probably become a model for other minischools in New York City and elsewhere.

The approach developed by Dr. Salvadori is based on the following basic principles:

Students will not learn unless the subjects taught are relevant to their lives.

The students must be treated as mature human beings, without condescension, and taught as rigorously as their level permits.

The experience of hands-on work with physically significant models and not simple games is essential to creating relevant interest in the students and enhance their native creativity.

The presentation of the principles on which cities develop (the built environment), including city planning, engineering, architechure, politics, history, geography and finances is essential to the maturing of the students in their approach to city life.

The comparision of the city environment with the natural environment gives relevance to environmental understanding and complements experiences in the natural environment. To this purpose the students at the Salvadori Minischool will be taken on visits to the city and to the countryside around New York.

The financing of the Salvadori Minischool comes from funds of the Drop Out Prevention Program of the Board of Education of New York City and did not require any increase in budgets. Funds for future work by the Salvadori Education Institute will be raised by the members of the Institute's Advisory Board, consisting of authorities from the fiedls of engineering, architecture, city planning, education, children psychology, and construction. The American Institute of Architects, through its Education Department headed by Mr. Alan Sandler, has supported the work of the Why Buildings Stand Up Program and is supporting the work of the Institute. Support is also given by the Education and Architechture Departments of the College of the City of New York. Other New York associations and institutions will become involved in the work of the institute in the near future.

For additional information, contact:

Salvadori Educational Institute
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333 Seventh Avenue,
New York 10001
212/563-5200

ACID RAIN/AIR POLLUTANTS EFFECTS ON FORESTS

by:

Harriet S. Stubbs, Ph.D.

The quality of our lives and our industries, agriculture, engineering and cultural resources are threatened by many various air pollutants.

Of major concern are the following substances: Sulfur dioxide, nitogen oxides, toxicant substances, carbon monoxide, particulate matter, ozone and other photo chemical oxidants, various "greenhouse gases" and acid rain.

Educators can utilize new research findings about the influence of air pollutants to enhance the teaching of science, social studies, environmental studies in the classroom; and outdoor studies in informal learning centers. By making research relevant to current issues discussed on radio, television and in newspapers, the linkage between current societal concerns and learning experiences can be very strong.

New acid rain publications/posters/audio-visual materials were presented with a status report of the issue at the present time.

Air Pollutants' Effects on Forest Ecosystems, a 4 part module developed for the Natural Resources & Environmental Education Program of the USDA Forest Service, was presented.

This packet includes an overview booklet, a series of inter-disciplinary activities for use in classrooms and outdoor education centers, a slide/tape and a bibliography.

The activities deal with four questions:

1) Why are trees important?
2) What are the pollutants in the air?
3) What air pollutants may affect trees?
4) What effects may air pollutants have on forest ecosystems?

We hope that those of you who would like additional information will send a SASE to The Acid Rain Foundation for the release date of these publications.

ENVIRONMENTAL EDUCATION IN PENNSYLVANIA

Dr. Dean Steinhart, Environmental Education Advisor
Pennsylvania Department of Education
Patricia Vathis, Environmental Education Associate
Pennsylvania Department of Education

All environmental education in Pennsylvania is based on the Master Plan for Environmental Education prepared in 1984 by a special task force. Our base of operation includes the schools, churches, service clubs, civic groups and the citizens at large in the Commonwealth.

Several programs have been initiated that are quite successful and involve many school districts. First, we have established environmental education week in Pennsylvania and a search for exemplary envirlonmental education programs across the state. Environmental education week is coordinated with the Pennsylvania Alliance for Environmental Education (PAEE) and all other state agencies in the interagency network of Pennsylvania. The major project of this week is a packet of environmental education buildings. Our search for exemplary environmental education is also a state wide effort and seeks to identify those schools with outstanding environmental programs.

A second effort is focused on teacher training at the college level and the in-service level of practicing educators. Last year (1987-88) , over 2000 teachers were trained and 800+ college seniors prior to their student teaching . The office has worked with both public and private post-secondary institutions in this effort.

The office continues to be involved with on-site school visits where curriculum is checked and the teaching of environmental education validated. About 40 school districts have been checked over the last year and our two year total stands at 96 districts.

A major portion of our activity is focused on interagency cooperation. We are working closely with the Department of Environmental Resources to institute new curriculum on recycling in the schools of the Commonwealth. Similar efforts are carried out with the Conservation Districts, Fish and Game Commissions and Sportsmen's Groups. These contacts have established networks within the state that promote a unified effort in our public schools.

Special pride is taken with the various conferences we go to each year. During 1988 presentations were made at two Environmental Protection Agencies conferences for Region III. Workshops were held at the National Science Teachers Convention in Pittsburgh, PA and at our State curriculum conference. The staff has also worked closely with the Pennsylvania Alliance for Environmental Education at their annual conference.

Public education and information is an on- going part of our collective schedules. We continue to present slide programs on Solid Wastes, Ground Water, the Chesapeake Bay, Land Ethics, Habitat loss and environmental education. Our presentations cover all civic organizations and many professional groups. This year we had the unique privilege of working with the National Garden Clubs leaders on a program titled, "Showcase of Environmental Education."

As we begin our fourth year in the Department of Education it is obvious that much work needs to be done. We will continue to seek a legislative base of operations and increased support from our state board of education. All in all it has been a very exciting time for environmental education in Pennsylvania.

FERN FOLKLORE - AMERICAN NATURE STUDY SOCIETY

By John Padalino

What's all this fuss about ferns? The fern fraternity is distinct in that it is not only one of the smaller (fewer in number - about 4,000 species in the world), but also among the older plant groups on earth. Legends about the ferns have been a long and lively curiosity. We now know with confidence that ferns have neither flowers nor true seeds, facts that exasperated early observers. Hence, not knowing much of the frutification of ferns contributed to fanciful legends loaded with myth and mystery.

For the nature study fanciers with out of doors, down to earth penchant there is excitement in seeking and finding ferns in fields, forests, and fens. This article focuses on some fact, fiction, and fables about ferns.

Thoreau wrote that "Nature made ferns for pure leaves, to show what she could do in that line." Dubbed, nature's lace work, fern fronds are essentially complete in the bud. These graceful and delicate leaves are mainly the result of a process of uncoiling, unrolling, and expanding. Nature's pattern for fern and its bud is the spiral. This coil posture, circinate vernation, is the one attribute members of the fern group hold common. The whole works, fronds, pinnae, pinnules each of the remotest divisions is rolled toward the next largest, then in toward the rachis and then beginning at the apex, rachis, and stipe are rolled down to the crown.

Ferns bear no flowers yet "fern seed" is still as elusive and uncertain today as it was during ancient times. Fern fanciers ascribe mystical and magical powers to the ferns by replacing fact with fiction and science with superstition. Many absurd notions were put forth regarding the fern's lack of flowers and seeds. As somewhat of a extension of the "Doctrine of Signatures," it was assumed that since the "seed" was invisible, it would enable its possessor to be invisible also. Fern seeds in your shoes could make you invisible as the seeds themselves. They could enable you to see into the past and the future to find lost articles and hidden treasures. They could grant health and the great gift of eternal youth. Ben Johnson in his New Inn stated, "I had no medicine sir to go invisible. No fern seed in my pocket." During the Middle Ages popular tradition associated St. John the Baptist with numerous marvels of the plant world. It was believed that he was born at midnight and a host of magical things were said to have happened on the eve of his birth precisely at twelve o'clock. An anonymous medieval poet recorded the fable:
But on St. John's mysterious night
Sacred to many a wizard spell,the time when first to human sightConfest, the mystic fern seed fell.

Another legend was that the fern seeds could only be collected on St. John's Eve by a barefoot seeker in a religious frame of mind. The popularity and acceptance of the mystic power of fern seeds was featured by Shakespeare in the play, Henry IV (Act II, Scene I) Gadshill states:
"We steal as in a castle, cock-sure;
We have the receipt of fern seed —
we walk invisible." The shepherd Chamberlin responded:
"Nay by my truth, I think you are
more beholding to the night than to
the fern seed for your walking invisible."

What did fern flowers look like and why did they "blossom" only on St. John's Eve? The mystery remains. However, their colors reported ranged from dark red to blue.

If you lived in the Ukraine and were able to gather the fern flowers you would be endowed with supreme wisdom and realize all your dreams. And in Poland it was believed that it thundered when the fern flowers were picked. Celtic and Germanic people considered ferns sacred and auspicious plants. Rites and ritual abounded throughout Europe regarding, "watching the fern," as the practice was called. Too much black art (mysticism) was in it to suit the Church, hence in France a Synod condemned all who should gather ferns or fern seeds on St. John's Eve.

One legend accounting for the fern's lack of flowers reveals that all ferns bore flowers until the Nativity. In honor of the event, the plants that were invited with straw in the manger blossomed. The ferns alone did not, therefore were condemned for ever afterward to be flowerless.

The "doctrine of signatures" as a theory was probably fathered by Paracelsus in the sixteenth century. According to Friend in 1884 nature had, in giving particular shapes to leaves and flowers, thereby plainly taught for what diseases they were especially useful. Thus a heart shaped leaf was for heart disease, a bright eyed flower for the eyes, and a foot shaped flower or leaf would certainly cure the gout, and so on. Ed Frankel noted that the medicinal merits ascribed to a particular fern was based ona mixture of "...fact, fiction, fantasy, and fable, to which were added liberal amounts of fraud, fakery, and falsehood." The state of medieval fern medicine and art was characterized by mysticism, necromancy, demonology, mythology, alchemy, astrology, and wortceremony (the art of using magic herbs) were blended in varying amounts with botany, medicine, pharmacy, and scientific study in deciding the leading properties of ferns.

Among the better known ferns is bracken, a cosmopolitan weed of the world that grows in diverse habitats. It is a tough rugged plant with resilient rhizomes that enable it to outgrow its competitors. Bracken has inspired many of the more interesting fern fables. It earned a place in botanical pharmacy as a vermifuge, worm expeller. Culpepper wrote in his Complete Herbal (1653), "The roots being bruised and boiled in mead and honeyed water, and drunk kills both the broad and long worms in the body, and abates the swelling of the spleen." Botanist Carl Linnaeus saw a "spread-eagle" in the the cross sectional cut of the lower stem. He gave the fern its species name aquilinium, latin for eagle. Additional reasons for calling bracken, "eagle fern" are the claw-like crosiers and broad fronds like eagle wings.

There are many superstitions about bracken. Again, in cross section higher up the stem one may see an arrangement of vascular bundles that looks like the letter C. This fern was good for protecting one from goblins, witches, and werewolves, "because it bears the initial of Christ." Some thought they saw the mark of the devil's hoof where the fronds divided on the stem. There were also those who subscribed to the myth that one could find the initial of one's sweetheart in the cut of the stem. The cross section of the bundles in the stem was also thought to resemble an oak tree. King Charles in the oak for the story is told how Charles II escaped enemies by hiding in an oak. Mary Isabella Tomkins summarizes the tale:

Have ye to learn how the eagle fern
Doth in its heart enshrine
An oak tree that which the hunter Hearn
Haunted in the days of "lang syne?"
An oak tree small is repeated all
Complete in branch and root,
Like the tree whereunto King Charles did flee,
When pressed in hot pursuit.

Addition ferns in fable and folklore include some of the following:
Spleenworts: for tired spleens;
Wall-Rue: a wort for all seasons and reasons, especially to combat baldness;
Maidenhair Fern: a curative for many maladies from A to Z;
Male and Female Ferns: symbolic of sex;
Polypody: performer of many pharmaceutical feats;
Royal Fern: regal remedy for tooth decay in place of fluorides;
Adder's Tongue: virtuous remedy for snake bite;
Moonworts: alchemists prize for turning "quick" into real silver.

Source of many of the fern's fables is their lack of seeds and flowers. Folklore focused on the "invisible" fern seeds which afford their finder magical and supernatural power as well as to be invisible. Ferns in medicine rose and fell with the Doctrine of Signatures. Among the more famous ferns in folklore are the ubiquitous Bracken. Maidenhair Fern has failed to prevent baldness; Male and Female Ferns may have been more successful as vermifuges than as aphrodisiacs; Royal Fern doesn't prevent tooth decay nor is Adder's Tongue an antidote for snake bite; and those magical powers ascribed to Moonwort border on lunacy.

EE PROGRAMS - CASE STUDIES OF STATE IMPLEMENTATION

Tanya Oznowich, Project Coordinator, Education
Program, New Jersey Department of Environmental Protection,
Office of Communication and Public Information

New Jersey is a diverse state with a large and dense population in a small land area, urbanization, heavy industry and manufacturing as well as many natural resources which surprise the out-of-state visitor. 40% of the sate is forested and another 21% of the land area is devoted to agriculture. There are 137 miles of coastline and the state has 90 state and municipally administered parks, natural areas and historical sites as well as the 1.1 million acre Pineland Preserve. The goal of the NJ Department of Environmental Protection is to protect the states natural resources.

The Office of Communications and Public Education has been recently created to achieve several objectives: to help raise the environmental literacy of the general public and to reduce the mis-information generated by skewed media coverage of environmental and natural resource issues. The Office also attempts to make the public aware of the functions of DEP. The Educational programs include media forums, conferences and special events geared to specific audiences within the state.

"Conserving Raptors"

Dr. Leonard J. Soucy, Jr., Director, The Raptor Trust

The Raptor Trust, located in Millington, New Jersey, is a private, nonprofit corporation dedicated to the conservation of raptors through education, research and rehabilitation.

Often, people are apprehensive of things they do not know or understand. Through our educational efforts we work to dispel the fears and misgivings which many people have about raptors, and to encourage respect and tolerance for them.

At our large, well-equipped rehabilitation center we supply quality care, diet and housing for hundreds of wild birds each year. Seriously injured birds often requrie x-rays and surgery. These services are provided by nearby participating veterniarians.

Orphaned young birds are raised at our center using techniques designed to avoid dependence on humans and assure them a reasonable chance of surviving when released. Our goal, always, is to return healthy, self-sufficient birds back into the wild where they belong.

All activities conducted by the Raptor Trust are licensed by the state of New Jersey and the United States Fish and Wildlife Service.

Color slide presentations are available on a variety of raptor subjects including field identification, migration, rehabilitation, and the general biology and ecology of birds of prey. Well-behaved birds can accompany our lecturers so that the audience can meet, face to face, live hawks and owls. As part of our educational effort we publish and distribute free raptor information sheets and nest box plans. A telephone advisory service is maintained to answer questions and help solve bird related problems.

Interested individuals and groups can arrange to visit our facility to observe, first hand, what a raptor rehabilitation center is and how it functions. The unreleasable hawks and owls used in our educational programs reside at the center and can be viewed at close range. A knowledgeable volunteer will accompany visitors and answer any questions.

The Role of Environmental Education in an Innovative Program for Youth-At-Risk Entering High School

by

John Padalino

During the summer of 1987 one hundred and sixty youth-at-risk from the New York Cityschools participated in the week-long residential, sleep-away camp experience at the Pocono Environmental Education Center (PEEC). The program was a component of the New York City Division of High Schools ICE (Institute for Career Exploration) program. This paper represents a report and evaluation results of that innovative secondary school enrichment program.

The goal of the summer programs under Chapter I is to improve the chance of school success for eligible incoming ninth and tenth grade students. To reach that goal and, thus, reduce the risk of failure, the students were afforded opportunities to improve skills in science, reading, writing, listening, and oral expression. The program had a strong component of support service to enhance self-esteem, engender positive attitudes toward learning, and foster psychological growth.

Eligible students under Chapter I often have an impoverished experiential background. They lack firsthand knowledge of the world beyond their immediate environment. One of the more promising means of improving the achievement and facilitating the development of youth-at-risk is the use of field experiences to provide experiential learning.

The goal of the outdoor environmental education component of the ICE program was to extend the school-based summer program to include a residential enrichment experience for the purpose of broadening the experiential background upon which learning is based. A sanative environment was the focus on which instruction in science, mathematics, English language arts (reading, writing, listening, and verbal communication), and group problem-solving activities was structured.

PEEC is especially well suited to meet the needs of this innovative program. It is a unique private, non-profit educational center for residential environmental education programs located within the boundaries of the Delaware Water Gap National Recreation Area twenty miles southwest of where New Jersey, New York, and Pennsylvania meet. In addition to its thirty-eight acres, the center is adjacent to over 200,000 acres of public lands and waters which contain thirty-nine areas of ecological significance identified by The Nature Conservancy as suitable for preservation and study.

Students in the ICE program were selected on the basis of interest, their summer school attendance record, recommendations by teachers and counselors, and parental interest and consent. Information about the program, consent forms, and instructions were sent to parents in three languages.

Twenty New York City teachers and supervisors and summer faculty members accompanied the ICE students. The school teachers were pivotal to the design of the program. Teachers actively participated in all experiences, including in-service interdisciplinary staff development, a weekend retreat, and a group dynamics training session at the New York Urban Coalition's Center for Educational Leadership. The teachers were also responsible for follow-up activities with the students. These instructional personnel were employees of PEEC for the purpose of the program. In addition a total of twenty-five counselors supervised the students and lived with the in cabins at the center. A number of experienced educational specialists, resource consultants, were also employed by PEEC to conduct activities and teach in the program.

Students experienced total education in a total environment where basic skills instruction was incorporated into an environmental studies theme. The format of the program enabled students to: (1) participate in a comprehensive living experience that afforded indepth learning, (2) develop self-confidence through meeting challenges in a new environment, (3) solve problems through cooperative endeavors and through individual efforts, (4) interact in a positive way with adult role models, (5) develop through direct hands-on and minds-on experiences the attitudes, values, and behaviors necessary to understand the importance of asanative environment, and (6) expand the experiential base upon which learning is built.

Instructional activities of the program included the following: (1) Writing — on their arrival at PEEC, the students were given a journal in which to record the highlights of each day's program and their reactions to the residential experience. Although journal writing was private, students used their writings as the basis for an essay, story or poem to be written over the course of the week. All students were introduced to word processing, wrote letters, and experienced mail-merging while they used a computer. In addition, with native materials they printed note cards which they addressed, stamped, and sent home. (2) Magazine Publication — the culminating activity at the end of the group's stay was the completion and revision of an edited piece of writing which was published in a magazine. (3) Scientific Writing — Careful taking of notes by students occurred during and after field sessions such as field ornithology and wildlife study. (4) Reading — Students

were afforded opportunities to read pieces from The Conservationist, a premier environmental magazine, and experience reading as recreation. Vocabulary was pre-taught and key components were discussed before material was read. The nature crafts component of the program incorporated "Learning to Read Through the Arts" instructional strategies. (5) Mathematics — Students gained experience in practical mathematical computation in conjunction with outdoor field studies. (6) Field Trips — Each student experienced three field trips: aesthetic, scientific, and historical/cultural. These included an excursion to G.W. Childs Park — a scenic gorge, a foray to a Devonian fossil dig, and a tour of the Gifford Pinchot Institute for Conservation Studies.

Additional learning activities included evening programs to increase the student's knowledge of the world. Speakers on environmental subjects engaged the students in "theater in the round" with an environmental focus. Speakers presented programs on reptiles and amphibians, birds of prey, and ecological cycles. Native American folklore and colonial culture were also topic of discussion. Folk and square dancing wre well received by the students as were swimming, canoeing, and daily after dinner volleyball games.

A leadership training component of the program fostered student development in affective as well as cognitive areas. Problems of substance abuse, sexual responsibility, sexually transmitted diseases, including AIDS, were discussed in leadership training sessions. The residential setting afforded opportunities for emotional growth. A cohesive feeling of community developed in the twenty-four hour day program that cannot be easily duplicated in a school environment. Within the residential community, students were helped to identify and examine their value systems. A variety of strategies were employed to assist students in learning more about themselves and to help them answer questions about how the PEEC experience changed them, changes in their values as a result of the program, and what they learned about themselves and their goals and aspirations.

A comprehensive evaluation of the program was conducted by an independent evaluator in which students, school teachers, counselors, and PEEC staff actively participated. The following four evaluation questions guided the evaluation: (1) Were the program's goals and objectives appropriate, well defined, and clearly understood by the participants? (2) To what extent were objectives for the students met as a result of the program? (3) To what extent were objectives of the school teachers met as a result of the program? (4) What were the programs strengths and weaknesses and can the program be improved?

The following objectives for the students were identified:

1. Increase in knowledge and understanding of the natural environment, their relation to their environment, the nature and importance of environmental problems and issues, and their role in helping to solve problems and issues.
and to help other students deal with them.
5. Increase in development of respect, concern, and responsibility for others and the ability to interact positively with adult role models.
6. Improve in leadership skills and in the capacity to solve problems cooperatively as well as individually.
7. Develop basic skills in reading, writing and mathematics.
8. Participate fully in the programs activities including:
   a. Maintaining a daily journal
   b. Writing letters, essays, poems, and stories
   c. Recording observation of nature
   d. Reading for recreation and skill development
   e. Using creative abilities in art and craft work
   f. Solving practical mathematical problems

Two general considerations guided the evaluation process: (1) all participants — students, school teachers, counselors, and PEEC staff — are also evaluators and their shared opinions, feelings, and insights about the program, what they gained, and the evaluation process, itself, are crucial to the assessment process and (2) the independent evaluator and the evaluation process should not intrude into the program to the extent that its effectiveness and efficiency are diminished.

The following evaluation design was developed:

	8/24/87 Pre	8/24/-28/87 Program	8/28/87 Post	1990-91 Follow-up
Students	Questionnaire	Observations	Questionnaire Interviews Examination of Artifacts	Graduation Records
Teachers		Observations	Questionnaire Interviews	
Counselors			Questionnaire Interviews	
PEEC Staff			Questionnaire Interviews	

The evaluator found strong and enthusiastic support for the program among the participants, almost without exception. A heavy weight of opionion prevailed that the program was an outstanding success and should be continued. There was little question in the minds of the counselors, school teachers and students that the program contributed to the students' chances of school success. There was clear evidence that the students gained in the develoment of positive social relationships and of school success. There was clear evidence that the students gained in the development of positive social relationships and of school success. There was clear evidence that the students gained in the development of positive social relationships. Counselors singled out the social benefits and confidence building as important aspects of the program.

Almost one-third of the students responded to a question about what they liked least said there was nothing - they liked everything. Twenty-four percent felt that the program should be longer. Improvement suggestions from the students included making changes in the hiking activiites and giving more flexibility in the use of personal time. Within the context of the generous praise for the program, counselors, teachers, and staff made many suggestions for improvement, including more clearly defined roles and responsibilities of counselors and teachers, establishing more formal contact between the teachersa and students, restructuring the scheduling and length of activity sessions, reorganizing the journal writing experience, providing more free time and options for students, communicating more clearly the program's goals and objectives, and selecting and confirming students eariler.

Major recommendations for the 1988 summer continuation included the following:

1. All sponsoring organizations and program personnel should be involved in developing and communicating the program's goals and objectives.
2. Continue to maintain the strong emphasis on self-concept development and socialization.
3. Present more opportunities for independent problem solving to balance the excellent teamwork activities.
4. Clearly define the role of teachers, counselors, and staff members.
5. Preserve the outstanding diversity of program activities.
6. Give consideration to the need to restructure the activity sessions with respect to length, scheduling, and numbers of students to be accommodated.
7. Fine tune the present organization and requirements of the journal writing activities to promote more involvement in writing.
8. Give consideration for providing more flexibility and freedom to the students in the use of free time and choices for activities.
9. Give consideration to earlier selection and confirmation of students for planning purposes.
10. Continue to keep criteria high for selection of counselors and consider selecting more with bilingual talents.

In conclusion, residential environmental education programs appear to provide a real opportunity for building a strength of character, human relationships, and environmental connections which reduce the risk of failure in school. The real effect; however, will not be learned until follow-up studies reveal the actual success of participants in their high school experience.

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INTERACTION
SHARING
INNOVATION
IMPLEMENTATION

CEA IS PEOPLE

WORKING FOR
- school systems
- organizations
- colleges and universitites
- businesses and industries
- nature centers
- government agencies

REACHING
- learners of all ages

TEACHING
- care and management of the human habitat

HELPING PEOPLE TO BECOME
- knowledgeable about interrelationships,
- skilled in decision-making and problem-solving
- committed to supporting a good quality of life for all people
- motivated to use their knowledge, skills and commitment both as individuals and in groups

STRIVING
- to expand conservation/environmental education in both formal and informal settings

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